VFD-G7 Series High-performance Vector Control General-purpose Frequency Inverter

Operation Manual

SPECTRA Technology CO., LTD. could supply all-round technology support for clients. The users could contact the nearby agency or customer service center, and also could contact the manufacturer directly. All rights reserved. Any alteration is made without notice.

Head office: SPECTRA Technology CO., LTD.

Customer hotline: 886-3-7360023

URL: www.spectra-tw.com

E-mail: info@spectra-tw.com

Content

CHAPTER 1 SAFETY AND NOTES 1

1.1 SAFETY DEFINITION 1
1.2 SAFETY NOTES 1
1.3 NOTES 4

CHAPTER 2 SPECIFICATIONS AND SELECTION 8

2.1 NAMING RULE 8
2.2 NAMEPLATE 8
2.3 MODEL AND TECHNICAL PARAMETERS 9
2.4 TECHNICAL SPECIFICATION 10
2.5 PRODUCT OUTLINE AND INSTALLATION HOLE SIZES 14
2.5.1 0.4KW~18.5KW Outline and Outer Size of Hang Machine Plastic Casing Frequency Inverter 14
2.5.2 22KW~450KW Outline and Outer Size of Hang Machine Metal Casing Frequency Inverter 16
2.5.3 0.4KW~450KW Installation Hole Size of Hang Machine G/P Frequency Inverter 17
2.5.4 Outline Size of Keyboard Operation Panel 18
2.6 SELECTION OF BRAKING PACKAGE 18
2.7 SELECTION OF DC REACTOR 19
2.8 FREQUENCY INVERTER DAILY MAINTENANCE 20
2.8.1 Daily Maintenance 20
2.8.2 Routine Checking 21
2.8.3 Replacing of Quick-wearing Parts 21
2.8.4 Storage 22
2.8.5 Warranty Instructions 22
2.9 SELECTION GUIDE 23

CHAPTER 3 MECHANICAL AND ELECTRICAL INSTALLATION 25

3.1 MECHANICAL INSTALLATION 25
3.1.1 Installation Environment 25
3.1.2 Installation Space 25
3.1.3 Cover Removing Way 27
3.2 ELECTRICAL INSTALLATION 28
3.2.1 External Electrical Component Selection: 28
3.2.2 Instructions For External Electrical Components 29
3.2.3 Method Of Connecting Wire 31
3.2.4 Main Circuit Terminals and Wiring 32
3.2.5 Control Circuit and Wiring 35

CHAPTER 4 KEYBOARD OPERATION AND DISPLAY 41

4.1 Introduction Of Keyboard Operation And Display Interface 41
4.1.1 Descriptions of Key Function 41
4.1.2 Descriptions of Function Indicators 42
4.2 Power On State 44
4.3 Descriptions of Function Code Check and Modification Method 44
4.4 Checking Method of State Parameter 45
4.5 Password Setup 46
4.6 Faults Reset 46
4.7 Auto-learning of Motor Parameters 46

CHAPTER 5 FUNCTION PARAMETER SIMPLE LIST 49

CHAPTER 6 FUNCTIONAL PARAMETER DETAIL 95

6.1 F0 Basic Function Group 95
6.2 F1 Start-Stop Control Group 107
6.3 F2VF Control Parameter Group 112
6.4 F3 Group Vector and Torque Control Parameter 116
6.5 F4 Group Input Signal Group 121
6.6 F5 Group Output Signal Group 127
6.7 F6 Group Multi-speed and PLC Program Run 134
6.8 F7 Group Process PID Parameter 138
6.9 F8 Group Communication Parameter 142
6.10 F9 Group Human-computer Interface 144
6.11 FA Group Enhancement Function Group 146
6.12 FB Group Protection Function Group 150
6.13 FC Group Application Parameter Group 1 154
6.14 Fd Group Application Parameter Group 2 154
6.15 FE Group Frequency Inverter Noumenon Parameter Group 155
6.16 FF Group Monitoring Variable Group 155

CHAPTER 7 COMMUNICATION PROTOCOL 160

7.1 Communication Allocation 160
7.2 Protocol Form 160
7.3 Protocol Form Instruction 160
7.3.1 Data type 160
7.3.2 Salve machine address 160
7.3.3 Read function code 161
7.3.4 Write operation function code 165
7.3.5 Abnormal Responding Function Code 168
7.4 CRC parity 170

CHAPTER 8 TROUBLESHOOTING 172

8.1 Faults and actions 172

8.2 COMMON FAULT AND HANDLING METHODS 176

CHAPTER 9 EMC 178

9.1 DEFINITION 178
9.2 EMC STANDARD INTRODUCTION 178
9.3 EMC DIRECTION 178
9.3.1 Harmonic Influence 179
9.3.2 EMI and Installation Notes 179
9.3.3 Handle interference of the environment to interfere the drive 179
9.3.4 Handle interference generated by drive to interfere the environment 179
9.3.5 Leakage current and its processing system 180
9.3.6 Note of installing EMC input filter in the power input side 181

APPENDIX 1 INSTRUCTION OF STANDARD EXPANSION CARD SC-EXT1-IO 182

APPENDIX 2 INSTRUCTION OF RELAY-OUTPUT EXPANSION CARD SC-EXT2-R 185

APPENDIX 3 INSTRUCTION OF MULTIFUNCTIONAL INPUT EXPANSION CARD SC-EXT3-S 187

Chapter 1 Safety and Notes

1.1 Safety Definition

In this manual, safety precautions divide the following two categories:

Danger

Operations without following instructions can cause personal injury or death.

Attention

Operations without following instructions can cause personal injury or damage to product or other equipment.

1.2 Safety notes

	Danger	
Before Installations	1. Please don't operate the damaged and incomplete drive. Otherwise there is a danger of human injury 2.Please use the insulation motor which class is above B, otherwise, there is electric shock danger.	

	⚠ Danger	
Installing	1. Please install the drive on fire-retardant material, reserve the drive away from combustible materials, otherwise, it would cause fire alarm!	2.If more than two drives are parked in the same cabinet, in order to the cooling effect of Drive, please note that installation position and refer to chapter 3 which is mechanical and electrical installation. 3. Don't allow Conductors and screws to fall inside the drive, otherwise there is a danger of damage.
Wiring	1. Only the electrical engineering personnel shall wire the drive, otherwise, there is electric shock danger. 2. Between the drive and power must have circuit a breaker, otherwise, it would cause fire alarm! 3. Never wire the drive unless the input AC supply is totally disconnected, otherwise, there is electric shock danger. 4. The drive must be properly earthed to reduce electrical accident, otherwise, there is electric shock danger.	5. Don’s connect the input power supply to output terminals U, V and W, otherwise, it would cause the damage of frequency inverter. 6. Wiring must accord with EMC requirements and the region safety standards. Please refer to the manual that advised about using wire line diameter. Otherwise accidents may occur. 7. Braking resistance cannot be directly connected into DC between bus (+) and bus (-) terminals. Otherwise there is a danger of fire.

	⚠ Danger	
Before power on	1. Reserve supply voltage and rated voltage of the drive in the same level, make sure the input and output wiring correct and check buffer circuit. Otherwise, the drive may be damaged. 2. Before power on, please make sure that the cover is installed. Otherwise, can lead to electric shock.	3. The products already have done a penetrative test, if redone, it may cause accident. 4. Please refer this manual provided circuit to correct connection peripheral accessories, to reduce electrical accident.
After power on	1. After power on, please don't open the cover of the drive, in order to avoid electric shock. 2. Don't touch the drive and peripheral circuit with wet hands. 3. Don't touch the drive's terminals including the control terminals with bare hands. 4. Initial power on, the drive is checking the safety of its external circuit with strong electric, so please don't touch the drive's terminals U、V、W and the motor's terminals.	5. When the motor is running, please carefully identify parameters. Otherwise accidents may occur. 6. Please don't randomly change the factory parameters of the drive, otherwise, will damage the drive.

	⚠ Danger	
Operating	1. Please Reserve far away from it, if restart the drive. Otherwise there is human injury. 2. Don't touch the cooling fans and discharge resistance with bare hands to test temperature. Otherwise, has burn dangerous. 3. Amateur technicians do not detect the signal during operating. Or it may cause a personal injury or damaged.	4. Don't allow matters to fall inside the running drive, otherwise it may be damaged; 5. Please don't use contactor to control drive start-stop, in order to reduce the damage.
Maintaining	1. Please don't charge for equipment repair and maintenance. Otherwise, have shocking danger; 2. Perform the maintenance and repair job after confirming that the DC Bus voltage is below 36V, in order to avoid electric shock. 3. Unprofessional trained personnel do not charge the repair and maintenance job. Otherwise caused human injury or damaged.	

1.3 Notes

✧ Insulation checking of motors

Before using the drive, the insulation of the motors must be checked, especially, if it is used for the first time, if it has been stored for a long time or regularly check. This is to reduce the risk of the drive from being damaged by the poor insulation of the motor. When checking ,must make sure the motors and the drive is separated, Please use

500V insulation tester to measure the insulating resistance. It should not be less than 5MΩ.

✧ Motor thermal protection

If the ratings of the driven motor are not in compliance with the drive, especially, the drive rated power more than motor rated power, be sure to adjust the protective threshold or to install thermal relay before the motor to ensure the motor is properly protected.

✧ Operate above power frequency

This drive can provide 0Hz~600Hz output frequency. If the user need to run the motor above rated frequency, please consider the affordability of mechanical devices.

✧ The mechanical device resonance

The drive system may encounter mechanical resonance with the load when operating within certain band of output frequency. Skip frequencies have been set to avoid it.

✧ Motor heat and noise

The output voltage is in PWM wave with some harmonics. Therefore, temperature rise, noise and vibration of motor are higher than 50Hz.

✧ Varistors or capacitors used to improve the power factor

Don't connect any varistor or capacitor to the output terminals of the drive, because the drive's output voltage waveform is PWM, otherwise tripping or damaging of components may occur; in addition, don't install circuit breaker or contactor at the output side of the drive.

✧ Circuit breakers connected to the input/output of the drive

If contactor is connected between the input power supply and the motor, Please don’t use contactor to control drive start-stop. If it must be done, interval time should not less than one-hour. If frequently charging and discharging, the life of the internal capacitance of the drive will be reduced. If circuit breaker or contactor needs to be connected between output side of the drive and the motor, be sure to operate these circuit breakers or contactor when the drive has no output, to avoid damaging of the drive.

✧ Using outside the range of rated voltage

The drive is unsuitable to be used out of the specified range of operation voltage;

otherwise, it may be damaged. If need, please use suitable voltage regulation device.

✧ Change from 3-phase to 2-phase
It is not recommended to change the drive from 3-phase input to 2-phase input. Otherwise it will lead to failure or damaged.

✧ Protection against lightning strike
There are transient surge suppressors inside the Drive which protects it against lighting strike. Department for frequent thunder and lightning, users should install the drive front-end protection.

✧ Derating due to altitude
Derating must be considered when the drive is installed at high altitude, greater than 1000m. Because of the thin air, the cooling effect of drive is deteriorated. Please contact our technical advice in this case.

✧ Special usage
If users need the wiring diagram, such as common DC bus, without in the manual, Please consult our company.

✧ Disposing unwanted drive
The capacitors may explode when they are burnt. Poisonous gas may be generated when the plastic parts like front covers are burnt. Disposing method: Please dispose the Drive as industrial waste.

Adaptive motor

1) If the motor isn't the four-pole squirrel-cage asynchronous induction motor. Please select the drive according to the rated current of the motor. If you choose the permanent magnet synchronous motor, please consult our company.

2) Because the cooling fan of non-inverter motor is coaxial connection with its rotor shaft connection, if the speed of the motor is reduced, the cooling effect of the fan is deteriorating, if the motor may become overheating in the situation, please change to inverter motor or install another fan.

3) The drive has built-in adaptive motor standard parameters, According to the actual situation, identify parameters or modify default of the motor to meet the actual value as far as possible; otherwise, it will affect the operating results and the protection of property.

4) Because the cable or the inside motor short circuit can cause the drive alarm, and even explosion. Therefore, the initial installing motor and cable must be done insulating short-circuit test. Note, when doing the test, make sure the drive and the tested part be completely disconnected.

Chapter 2 Specifications and Selection

2.1 Naming Rule

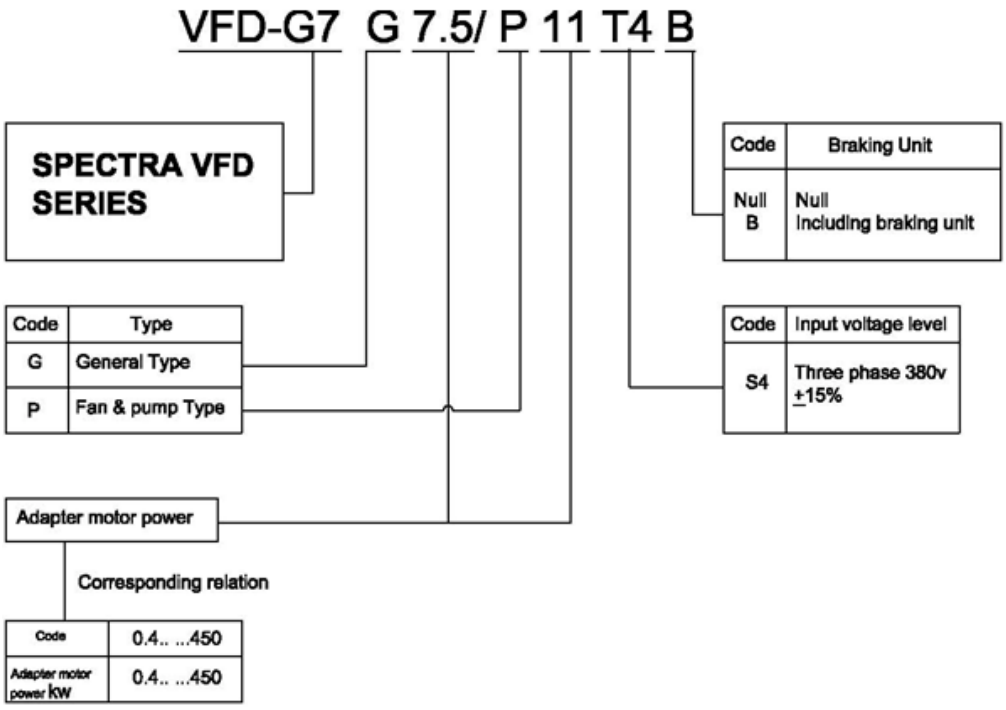


Figure 2-1 Naming rule

2.3 Model and Technical Parameters

Table2-1 VFD-G7 frequency inverter model and technical parameters

VFD Model	Input V	P capacity(KVA)	Input C(A)	Output C(A)	Motor P(KW)
VFD-G7-G0.4S4B	3Phase 380V Range：±15%	1.0	2.4	1.2	0.4
VFD-G7-G0.75S4B		1.5	3.4	2.5	0.75
VFD-G7-G1.5S4B		3.0	5.0	3.7	1.5
VFD-G7-G2.2S4B		4.0	5.8	5.0	2.2
VFD-G7-G3.7/P5.5S4B		5.9	10.5	9/13	3.7/5.5
VFD-G7-G5.5/P7.5S4B		8.9	14.6	13/17	5.5/7.5
VFD-G7-G7.5/P11S4B		11.0	20.5	17/25	7.5/11
VFD-G7-G11/P15S4B		17.0	26.0	25/32	11/15
VFD-G7-G15/P18.5S4		21.0	35.0	32/37	15/18.5
VFD-G7-G18.5/P22S4		24.0	38.5	37/45	18.5/22
VFD-G7-G22/P30S4		30.0	46.5	45/60	22/30
VFD-G7-G30/P37S4		40.0	62.0	60/75	30/37
VFD-G7-G37/P45S4		57.0	76.0	75/90	37/45
VFD-G7-G45/P55S4		69.0	92.0	90/110	45/55
VFD-G7-G55/P75S4		85.0	113.0	110/150	55/75
VFD-G7-G75/P93S4		114.0	157.0	150/176	75/93
VFD-G7-G93/P110S4		134.0	180.0	176/210	93/110
VFD-G7-G110/P132S4		160.0	214.0	210/253	110/132
VFD-G7-G132/P160S4		192.0	256.0	253/300	132/160
VFD-G7-G160/P185S4		231.0	307.0	300/340	160/185
VFD-G7-G185/P200S4		242.0	350.0	340/380	185/200
VFD-G7-G200/P220S4		250.0	385.0	380/420	200/220
VFD-G7-G220/P250S4		280.0	430.0	420/470	220/250
VFD-G7-G250/P280S4		355.0	468.0	470/520	250/280
VFD-G7-G280/P315S4		396.0	525.0	520/600	280/315
VFD-G7-G315/P350S4		445.0	590.0	600/640	315/350
VFD-G7-G350/P400S4		500.0	665.0	640/690	350/400
VFD-G7-G400/P450S4		565.0	785.0	690/800	400/450

2.4 Technical Specification

Table2-2 SVF-G7 Frequency Inverter Technical Specifications

Item		Specification
Input	Rated voltage	T4 series: Three phase 380v, ±15%
	Frequency	50/60Hz ±5%
Output	Voltage	Three phase 0-380V
	Frequency	0-600Hz
	Overload ability	Type G: 150% rated current for 1 minute, 180% rated current for 2 second; Type P: 120% rated current for 1 minute, 150% rated current for 2 second.
Heat Dissipation	Cooling type	Forced Cooling
	Temperature protection	Heatsink temperature >85℃ trip protection against overheat
	Fan control	Heatsink temperature> 50℃, fan forced operation, frequency inverter continue work
Control Performance	Control mode	Open-loop vector control, V/F control, Torque Control
	Start torque	Open-loop vector control: 0.5Hz 180%; VF control：0.5Hz 150%
	Speed range	Open-loop vector control: 1:200; VF control：1:100
	Speed control precision	Open-loop vector control: ±0.2%; VF control：±0.5%

	Torque control precision	Open-loop vector control: ±5%
	Torque response time	Open-loop vector control: <20ms
Function	Channel of operation command	Keyboard control , terminal control , communication control
	Start mode	Direct start, DC injection braking before start, speed tracking before start
	DC injection braking	Start DC injection braking, stop DC injection braking
	Dynamic braking	Built-in braking unit < = 11kw, get external braking unit>15kw
	Frequency source choice	Keyboard digital frequency setting, analog V1 setting, analog V2 setting, Keyboard potentiometers setting, Multiple speed operation setting, PID control setting, telecommunications setting, PLC program operation setting, HDI High Speed Pulse setting
	Main and auxiliary frequency combination set	Just main frequency setting, just auxiliary frequency setting, QUICK/JOG or terminal switching selection, main frequency + auxiliary frequency, main frequency - auxiliary frequency, maximum, minimum, could realize Frequency overlay and fine adjustment function
	Frequency resolution	Keypad setting:0.01Hz; Analog setting: 0.1%

	Carrier frequency	0.5Khz~15.0Khz, both PWM mode could be chosen
	Acc/Dec time	0.1~3600.0s
	Multiple VF curve	Linear V/F curve, 2.0 times power drop torque V/F curve, custom V/F percentage (can realize manual energy saving control), multipoint VF curve.
	Built-in PID	Built-in PID controller, apply to process control occasion such as water or gas supply. Meanwhile the sleep wake up function could save energy to the great extent possible.
	Simple PLC operation	16 segment goal setting, frequency or mode of percentage setting could be chosen, each segment of operation time and direction could be set separately, and realize timing stop function.
	Common function	Speed tracking, Cut-off restart, fault recovery, Automatic torque promotion, the motor's parameters auto-learning, Pendulum frequency operation, hopping frequency, UP/DOWN control, AVR, Over-voltage stalling protection, rapid current-limiting, Instant power down and drop frequency operation
Input Output Signal	Analog input	V1:0~10V V2:4~20mA or 0~10V, Select through JP2 jumper Keyboard potentiometer input: 0~5V

	Analog output	FM1:0~10V or 0~20mA, Select through JP9 jumper FM2:0~10V or 0~20mA, Select through JP10 jumper. Need the support of SC-EXT1-IO expansion cards
	Digital input	Standard configuration S1~S6, can expand S7~S10 through SC-EXT3-S expansion cards. A total of 30 kinds of function could be selected.
	Digital output	Standard configuration 2 channel including SP1, SP2 electrode output; 1 channel relay output T1; Expanding 4 channel relay output T2~T5 through SC-EXT2-R expansion cards.
	High-speed pulse input	HDI: 0~50.0Khz, support by expansion cards SC-EXT1-IO
	High-speed pulse output	HDO: 0~50.0Khz, support by expansion cards SC-EXT1-IO
Communication Port	Communication protocol	Based on RS485 hardware, support standard MODBUS protocol, should match expansion cards SC-EXT1-IO
Expansion Cards	3 type expansion cards	Standard expansion cards SC-EXT1-IO, Relay expansion cards SC-EXT2-R (can realize one drives 2 function), Multifunctional input expansion card SC-EXT3-S, refer to the explanation in Appendix.
Display	Five digital tube	Can monitor the operation state of frequency

Functions	display	inverter flexibly and conveniently; can set normal monitoring parameters separately when operation and stop.
Protection Function	25 kinds of protection functions	Including over-voltage, over-current, overheat, overload, under-voltage, short circuit, ground fault, input and output default phase, protect the frequency inverter running reliably all-round.
Installation Environment Requirement	Ambient temperature	-10℃~+40℃(ambient temperature is within 40℃~50℃, derating use is required), not allow to contact direct sunlight.
	Humidity	Less than 90%RH, without condensation
	Application environment	Non-corrosive, flammable, explosive, dust absorbent material, all kinds of lint does not accumulate.
	Vibration	Less than0.6G
	Elevation	0~1000m, reduce the rated specification 10% when lift 1000m for each.
	Storage temperature	-20 ~ 60℃

2.5 Product Outline and Installation Hole Size

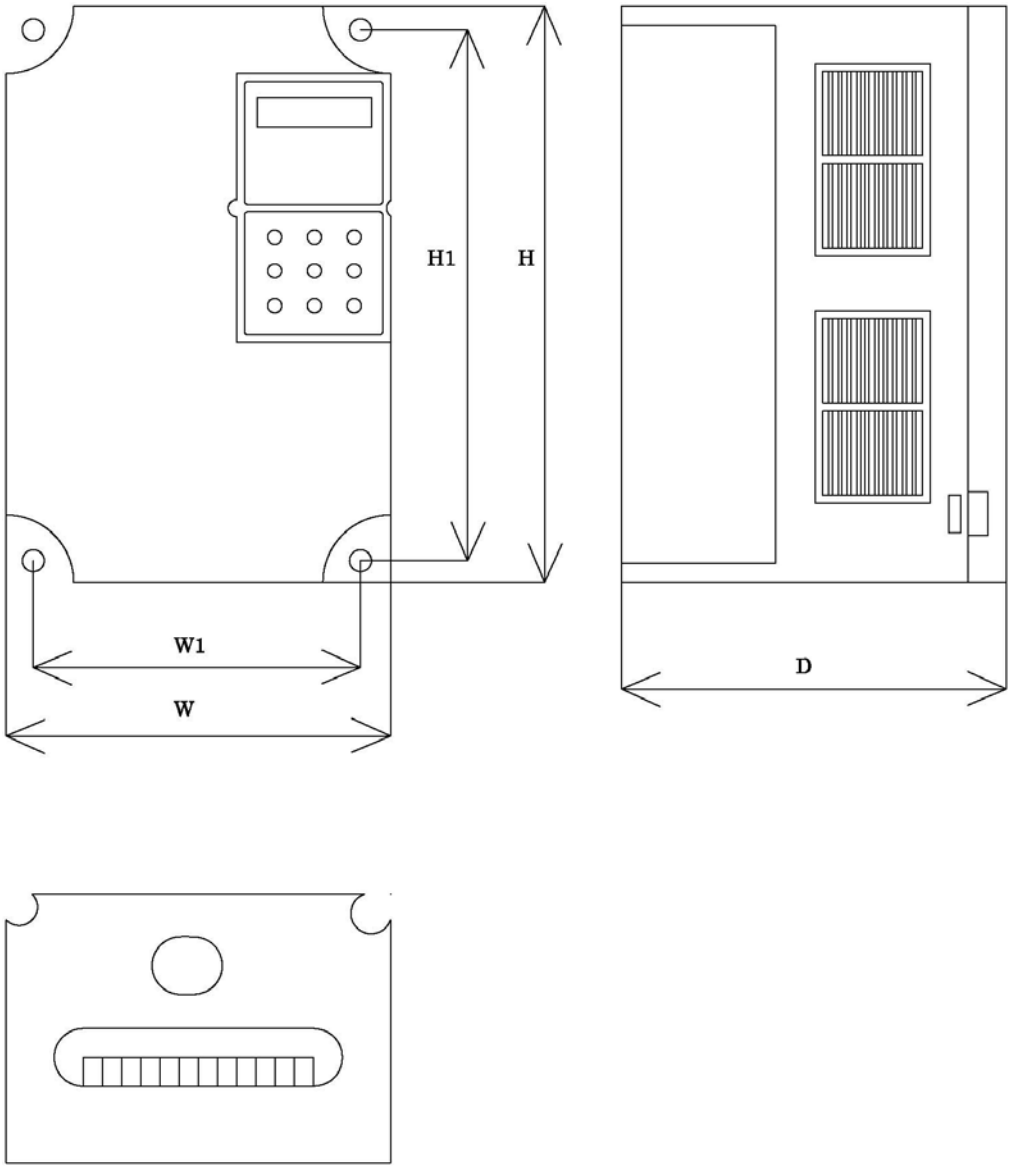
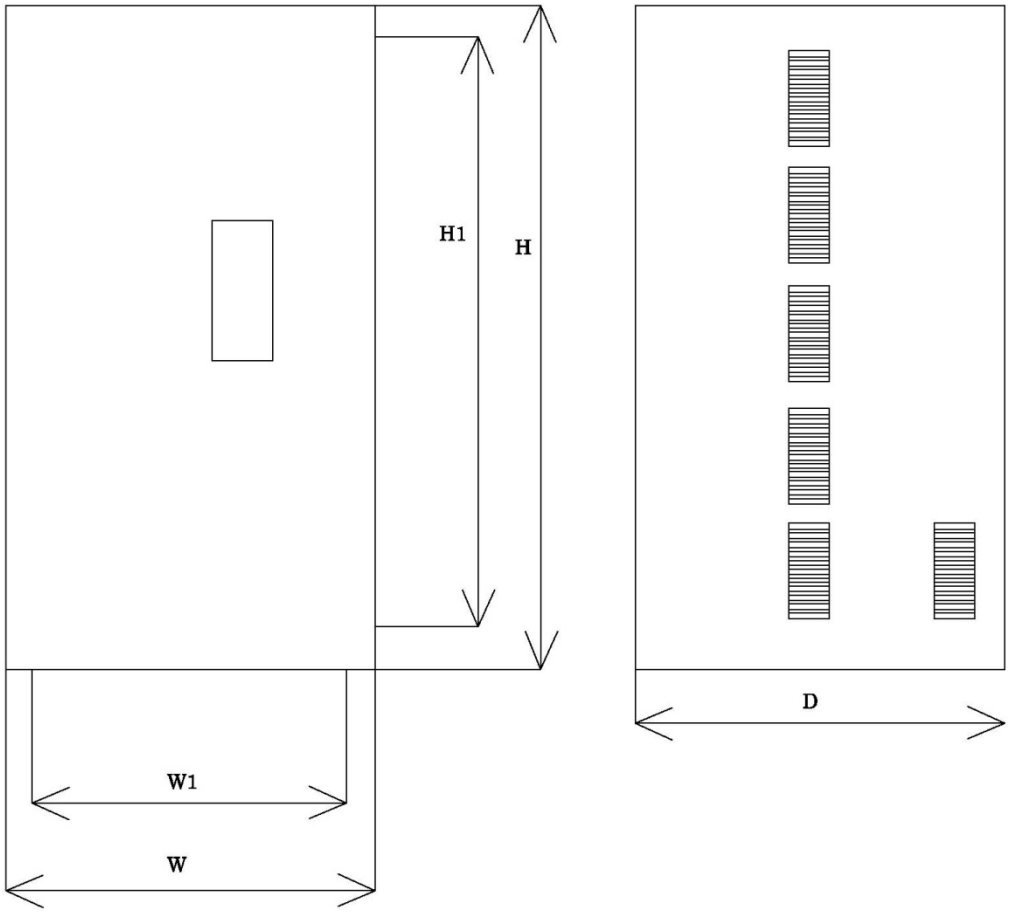


Figure 2-4 SVF-G7 Series 22KW~450KW Outline and Outer Size of Hang Machine Metal Casing Frequency Inverter

2.5.3 0.4KW~450KW Installation Hole Size of Hang Machine G/P Frequency Inverter

Table 2-3 0.4KW~450KW Installation Hole Size of Hang Machine G/P Frequency



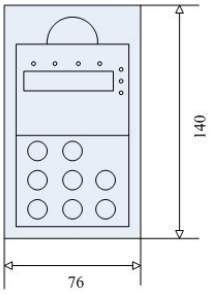
Inverter (mm)

VFD Model	W1	H1	W	D	H	Installation Aperture	Weight(Kg)

VFD-G7-G0.4S4B	96	190	105	154	200	Φ4	2.2
VFD-G7-G0.75S4B							
VFD-G7-G1.5S4B							
VFD-G7-G2.2S4B							
VFD-G7-G3.7/P5.5S4B	143	233	155	175	245	Φ5	4
VFD-G7-G5.5/P7.5S4B							
VFD-G7-G7.5/P11S4B	196	313	210	189	320	Φ7	7
VFD-G7-G11/P15S4B							
VFD-G7-G15/P18.5S4	240	345	255	220	360	Φ6.5	10
VFD-G7-G18.5/P22S4							
VFD-G7-G22/P30S4	160	484	280	262	502	Φ8	17
VFD-G7-G30/P37S4							
VFD-G7-G37/P45S4	210	555	346	278	575	Φ8	37
VFD-G7-G45/P55S4							
VFD-G7-G55/P75S4	220	619	386	294	643	Φ10	50
VFD-G7-G75/P93S4	260	690	436	313	721	Φ10	61
VFD-G7-G93/P110S4							
VFD-G7-G110/P132S4	150+150	750	503	352	785	Φ12	78
VFD-G7-G132/P160S4							
VFD-G7-G160/P185S4	220+220	872	688	351	914	Φ12	130
VFD-G7-G185/P200S4							
VFD-G7-G200/P220S4							
VFD-G7-G220/P250S4	150+150 +150 +150	1160	803	397	1206	Φ12	190
VFD-G7-G250/P280S4							
VFD-G7-G280/P315S4							
VFD-G7-G315/P350S4	200+200 +200	1340	820	390	1370	Φ12	250
VFD-G7-G350/P400S4							
VFD-G7-G400/P450S4							

2.5.4 Outline Size of Keyboard Operation Panel

1) Keyboard Outline Dimension (mm) 2) Keyboard Installation Hole Size (mm)



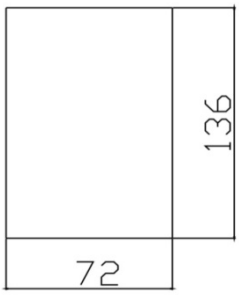


Figure 2-5 Keyboard Outline Dimension Figure 2-6 Keyboard Installation Hole

2.6 Selection of Braking Package

☞Note: Table 2-4 is the guide data, according to the actual situation, the user can choose different resistance and power, (the resistance must not be greater than the recommended value in the table, but the power could.). The motor's power in the practical application system, determine the braking resistor, which have relationship with system inertia, deceleration time, potential energy of the load, the customer should select according to the actual situation. The greater the system inertia, the shorter the time required deceleration, braking the more frequent, the braking resistor should have the greater power and the smaller resistance.

Table 2-4 Selection ofVFD-G7 VFD's Braking Package

VFD POWER (KW)	Recommended braking resistor TYPE	Braking Resistor Quantity	Braking Resistor Power (W)	Braking Resistor Resistance (Ω)	Recommended Braking Unit	Braking Unit Quantity
0.4～0.75	SC-BR700-W100	1	100	≥500	Standard Built-in	

1.5 ~ 2.2	SC-BR300-W300	1	300	≥200		
3.7 ~ 5.5	SC-BR100-W500	1	500	≥75		
7.5 ~ 11	SC-BR70-W1000	1	1000	≥50		
15 ~ 18.5	SC-BR50-W2000	1	2000	≥40	SC-CBU30T4	1
22 ~ 30		2	4000	≥20		
37 ~ 55		3	6000	≥15	SC-CBU55T4	1
75 ~ 93		5	10000	≥10	SC-CBU93T4	1
110 ~ 132		7	14000	≥6	SC-CBU200T4	1
160 ~ 200		10	20000	≥4.5		1
220 ~ 250	SC-BR50-W2000	13	26000	≥3.5	SC-CBU200T4	2
280 ~ 315		17	34000	≥2.5		
350 ~ 400		20	40000	≥2		

2.7 Selection of DC Reactor

SVF-G7 Series frequency inverter, G37/P45KW~G400/P450KW all use external DC reactor, (DC reactor usage: power grid harmonic suppression, to improve the input power factor of the inverter.) Users could select the DC reactor based on actual situation. Users need to remove the short circuit copper bars between the main circuit terminals (+) and P when installation, then the DC reactor could be connected between the (+) and P, there is no pole between the reactor terminals and the inverter terminals (+), P. After installing the DC reactor, the short circuit copper bars between (+) and P short circuit is no longer used.

Table 2-5 Selection of VFD-G7 VFD External DC reactor

VFD POWER (KW)	DC Reactor Configuration	Recommended DC Reactor TYPE	Reactor Rated Current(A)	Notice

VFD POWER (KW)	DC Reactor Configuration	Recommended DC Reactor TYPE	Reactor Rated Current(A)	Notice
0.4 ~ 30	Without external DC reactor terminals	Without external DC reactor terminals		
37 ~ 55	Optional external DC reactor	SC-DCL150	150	For the method of external DC reactor, please check the chapter 3
75 ~ 93		SC-DCL250	250	
110 ~ 132		SC-DCL300	300	
160 ~ 200	Standard external DC reactor	SC-DCL400	400	
220 ~ 280		SC-DCL600	600	
315 ~ 400		SC-DCL800	800	

2.8 Frequency Inverter Daily Maintenance

2.8.1 Daily Maintenance

Many factors such as ambient temperature, humidity, dust, vibration will casue the internal components aging and give rise to the occurrence of potential faults or lessen the service life of the VFD. Therefore, it is necessary to conduct routine maintenance to the VFD.

⚠ Attention
The high voltage still exist in the filter capacitor when the power is off, so maintenance to the VFD couldn't be performed immediately, it could be performed if the busbar voltage (the voltage between terminals (+) and (-)) measured by multimeter after 5 minutes is below 36V.

Daily inspection items:

1) When running,whether the motor has abnormal sound.

2) When running,whether the motor generates vibration.

3) Whether the installation environment of the VFD changes.

4) Whether the cooling fan of the drive is working properly.

5) Whether the VFD is overheating

Daily cleaning:

1)Reserve the drive in a clean state.

2)Effectively remove the dust on the surface of the inverter to prevent dust entering the inside of the inverter, especially the metal dust.

3) Effectively clear the oil from the cooling fan.

2.8.2 Routine Checking

Check regularly the place which is difficult to check when the drive is running, routine checking items:

1) Check the air duct, and regularly clean.

2) Check whether the screws are loose.

3) Check whether the drive is corroded.

4) Check whether the terminals have arc traces.

5) Check whether the main circuit is insulation.

☞Notes: When using a DC 500V Mega-Ohm-Meter to test insulating resistance, please make sure the mian circuit and the frequency inverter is disconnected. please don't use the insulation resistance meter to test the insulation of the control circuit. High voltage test is unnecessary(it has already been conducted before delivery).

2.8.3 Replacing of Quick-wearing Parts

The quick-wearing parts of the frequency inverter mainly includes cooling fan and electrolytic capacitors for filters. Their lifetime depends largely on their application environment and maintenance condition. Normally, lifetime is:

Components	Life
Fan	2~3 years
Electrolyte capacitor	4~5 years

The user can decide the replace age limit according to the running time.

1.Cooling fan

Possible cause of damages: wear of the bearing, aging of the fan vanes.

Criteria: Check if there is crack on fan vanes and other parts. When the inverter is switched on, check if there is any abnormal vibration.

2. Filtering Electrolytic capacitors

Possible cause of damages: the quality of input power is bad, the ambient temperature is high, frequent loading jump and aging of electrolyte.

Criteria: Check if there is any leakage of liquids. Check if the safety valve protrudes. Measurement of static capacitance and insulation resistance.

2.8.4 Storage

After buying the inverter, when store for temporarily and long-term, the following notes is important:

1) As far as possible store into the original packaging.

2) Long-term storage will cause the deterioration of electrolytic capacitors. Therefore, the inverter must be powered within 2 years, and the conduction time is at least for 5 hours. The input voltage must be boosted gradually to the rated value by the voltage regulator.

2.8.5 Warranty Instructions

Our company would offer the after sales if the following conditions occur to the frequency inverter:

1) Free warranty is only confined to the frequency inverter itself;

2) Under normal use condition, if there is any faults or damages, our company will take the responsibility of 12 months defects liability period for under the normal operation conditions(from the manufacturing delivery day on, and subject to the machine bar code). After 12 months, reasonable maintenance will be charged;

3). Even within 12 months, maintenance fee would be charged under the following conditions:

① Damages incurred to the inverter due to incorrect operation, which are not in compliance with “User Manual”;

② Damages incurred to the inverter due to fire, flood, abnormal voltage and so on;

③ Damages incurred to the inverter due to the improper use of inverter functions;

4. Related service fee will be calculated according to the unified standards of the manufacturer. If there are any maintenance contracts, the contract prevail.

2.9 Selection Guide

When selecting the frequency inverter, firstly, you must not only be clear on the technical requirements the system to the frequency inverter, the using situations, the specific load characteristics, but also take other factors such as adapter motor, output voltage and rated output current into consideration, then you can select the models which meet your requirements and make sure the mode of operation.

Basic principles: the motor rated load current must not exceed the rated current of the frequency inverter. Generally, choose according to the matched motor capacity stipulated by the instructions, please pay attention to compare the rated current of the motor and the frequency inverter. The overload capacity of the inverter is designed aimed at the short time overload in the process of starting and braking process. For constant torque load or the applications where the load is a little heavies, if there is overload situation in the process of running, it will exceed the output ability of the frequency inverter, so please consider to amplify a grade.

Fan and water pump : Fan and water pump types have lower requirements in the overload ability. The load torque is proportional to the square of the speed, so the inverter which running at the low speed has a light load (except for the Roots blower), and because this kind of load has no special requirements on the rotate speed accuracy, the P-type can be choosed.

Chapter 3 Mechanical and Electrical Installation

Warning

In order to ensure the safe and reliable running and operation of the products, the frequency inverter must be properly installed and operated under the guidance of qualified personnel .And pay special attention to the work codes and specifications of the high-voltage.

3.1 Mechanical Installation

3.1.1 Installation Environment

1) Ambient temperature: The surrounding environment and temperature has great influence on the life of the frequency inverter, the running ambient temperature of the frequency inverter should be within the temperature range of -10℃~50℃.

2) The frequency inverter should be installed on the surface of the antiflamming goods, there must be enough space for heat dissipation around, install the inverter vertically on the support with the screw.

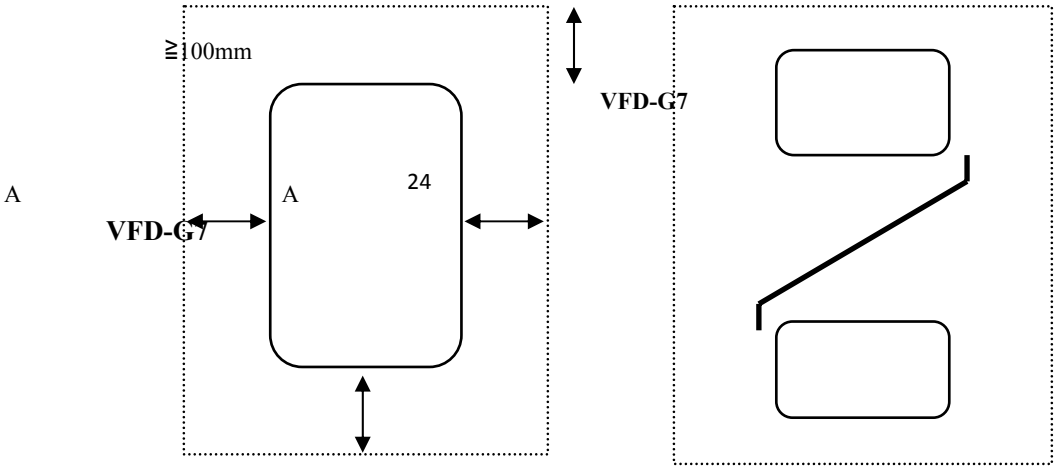
3) Install in the location where vibration is less than 0.6G, Pay special attention to be away from the punch press and other equipments.

4) Install in the location free of direct sunlight, wet, drops of water.

5) Install in the location Reserve away from corrosive gas ,Flammable gase or explosive gas.

6) Install in the location avoid greasy dirt, dust, metal dust.

3.1.2 Installation Space



Single Installation	Upper and lower Installation
☞Note: When the frequency inverter power is less than 22KW, size “A” could not be considered to install, on the contrary, size “A” should be longer than 50mm.	☞Note: When two frequenccy inverters are mounted one on top the other, an heat insulation guide plate should be fixedin between as shown in above Fig

Fig.3-1 VFD-G7 Frequency Inverter Installation

When installing, the thermal dissipation should be paid attention to. so please note the following:

1) In order to easy to dissipate the thermal, please install the inverter vertically. But can not be inverted. If there are several inverters in the cabinet, the best method is to instal side by side .When two Variable Speed Drives are installed one on top the other, the heat insulation guide plate should be installed between as shown in Fig. 3-1.

2) The requirements on installation space are shown in Fig. 3-1 which should ensure the heat dissipation space of the frequency inverter. Layout should ensure the heat dissipation condition of other components in the cabinet.

3) Mounting bracket must be flame-retardant material.

4) For the location where there is metal powder, the inverter should be mounted outside of the cabinet. If the space is sealed, should make the cabinet having space as large as possible.

3.1.3 Cover Removing Way

⚠ Danger
When removing the cover, Please avoid it falling down to damage the device and cause personal injury !

1) Cover Removing of Plastic Casing Frequency Inverter

As shown in Figure 3-2, operate according to serial number, notice that please extract the keyboard first, otherwise, if removing the cover forcibly, it will cause the keyboard and the control board broken.

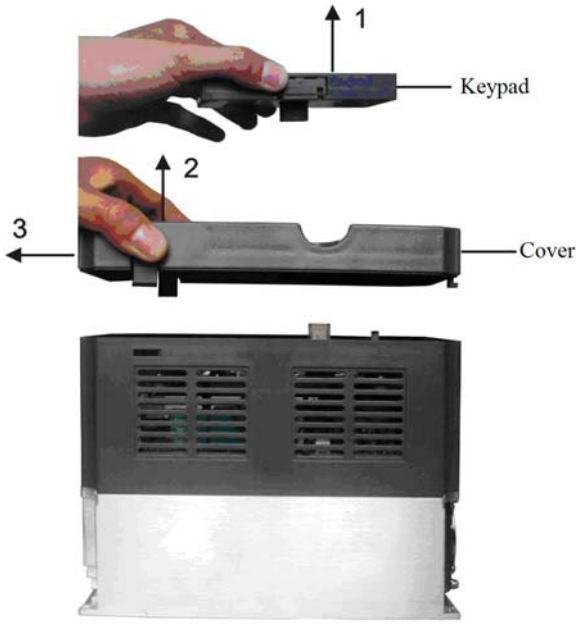


Fig. 3-2 Removing the above and under cover of the frequency inverters below 22kw

2) Cover Removing of Metal Casing Frequency Inverter

As shown in Figure 3-3, operate according to serial number, the control terminals of 75~400KW models need to remove the above cover to wiring, for other models, it only need to remove the below cover to connect the control line. When remove the above cover, please note the connecting line of the keyboard operation panel, and when removing the above cover, please pull the keyboard connecting line from the "J6", when

recover it, please remember to re-inserted.

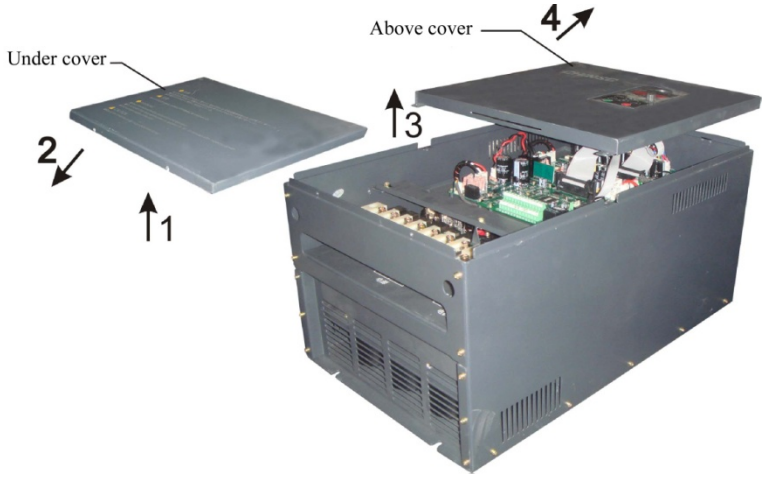


Fig. 3-3 Removing the above and under cover of the frequency inverters above 22kw

3.2 Electrical Installation

3.2.1 External Electrical Component Selection:

Table 3-1 0.4KW~400KW frequency inverter external electrical component selection

VFD Model	Air Switch(A) (MCCB)	Recommendation Contactor(A)	Recommendation Main Circuit Wire(mm²)	Recommendation Control Circuit Wire
VFD-G7-G0.4S4B	10	10	2.5	1
VFD-G7-G0.75S4B				
VFD-G7-G1.5S4B	16	10	2.5	1
VFD-G7-G2.2S4B	16	10	2.5	1
VFD-G7-G3.7/P5.5S4B	25	16	4	1
VFD-G7-G5.5/P7.5S4B	32	25	4	1
VFD-G7-G7.5/P11S4B	40	32	4	1
VFD-G7-G11/P15S4B	63	40	4	1

VFD-G7-G15/P18.5S4	63	40	6	1
VFD-G7-G18.5/P22S4	100	63	6	1
VFD-G7-G22/P30S4	100	63	10	1
VFD-G7-G30/P37S4	125	100	16	1
VFD-G7-G37/P45S4	160	100	16	1
VFD-G7-G45/P55S4	200	125	25	1
VFD-G7-G55/P75S4	200	125	35	1
VFD-G7-G75/P93S4	250	160	50	1
VFD-G7-G93/P110S4	250	160	70	1
VFD-G7-G110/P132S4	350	350	120	1
VFD-G7-G132/P160S4	400	400	150	1
VFD-G7-G160/P185S4	500	400	185	1
VFD-G7-G185/P200S4	600	600	150*2	1
VFD-G7-G200/P220S4	600	600	150*2	1
VFD-G7-G220/P250S4	600	600	150*2	1
VFD-G7-G250/P280S4	800	600	185*2	1
VFD-G7-G280/P315S4	800	800	185*2	1
VFD-G7-G315/P350S4	800	800	150*3	1
VFD-G7-G350/P400S4	800	800	150*4	1
VFD-G7-G400/P450S4	1000	1000	150*4	1

3.2.2 Instructions For External Electrical Components

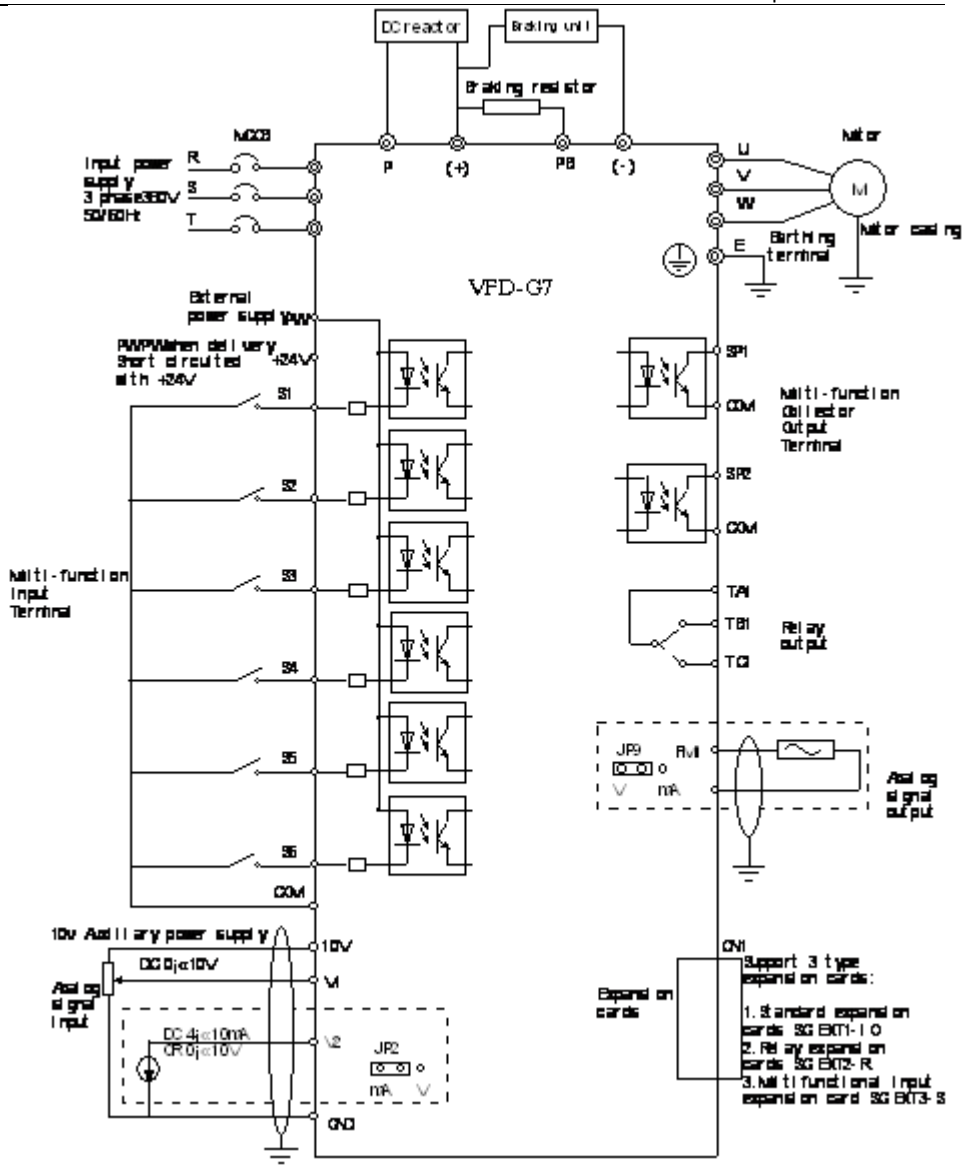
Table 3-2 Instructions for VFD-G7 series VFD external electrical components

Name	Install Location	Function
Air switch MCCB	Front of input circuits	When downstream devices is over current, breaking the power.

Name	Install Location	Function
Contactor	Between the air switch and the input of frequency inverter	The frequency inverter power on and off, should avoid frequently operating by the contactor or doing direct start-up operation.
AC Reactor	Input side of the frequency inverter	1) Improve the input power factor of the drive 2) Suppress the high-order harmonics of the input side; prevent the other equipment damage for the voltage waveform distortion.
Input EMC Filter	Input side of the frequency inverter	1) Reduce the frequency inverter external conduction and radiation disturbance. 2) Reduce interference of conduction flowing from the power to the drive, and improve the anti-interference ability of the drive.
DC Reactor	Between(+) and P of the main circuit terminals	1)improve the input power factor of the drive 2) Improve efficiency and thermal stability of the whole frequency inverter. 3) Suppress the high-order harmonics of the input side; reduce external conduction and radiation disturbance.

Name	Install Location	Function
AC Output Reactor	Between the output side of the frequency inverter and motor. Near the drive	The output side of the frequency inverter generally contains more the high-order harmonics. When the distance between the frequency inverter and the motor is fart, there is large distributed capacitance in the line, the high-order harmonics may produce resonance in loop, bring two influences: 1) Destroy motor insulation performance, might damage the motor for a long time. 2) Have caused a greater leakage current and the frequency inverter will trip frequently. Generally, when the cables from the frequency inverter to motor are longer than 100m, an output AC line reactor should be used.

3.2.3 Method Of Connecting Wire



Notice：This drawing applies to VFD-G7-G0.4S4B ~ VFD-G7-G400/P450S4

Figure3-4 VFD-G7 Drawing of Frequency inverter wire connection

3.2.4 Main Circuit Terminals and Wiring

⚠ Danger
1.Before wiring, make sure the power switch is OFF,otherwise,can lead to electric shock. 2. Only trained professionals can do wiring, so as to avoid the risk of the drive damage and the personal Injury. 3.The drive must be properly earthed to reduce electrical accident and fire.

⚠ Attention
1. Ensure that the drive's rated input voltage is identical with the AC supply voltage before using it. 2.Confirm the motor and the drive adaptation, otherwise, make damage the drive or cause the motor triping. 3. It is prohibited to connect the AC supply cables to the drive's terminals U, V and W. 4. Braking resistor can not be directly connected to the DC bus (+),(-).

1) Introduction of main circuit terminals of the 3-phase frequency inverter

Sign	Name	Description
R、S、T	3-phase power supply input terminals	3-phase 380V AC supply connections
(+)、(-)	DC bus wire(+,-) terminals	DC bus input common point, Reserved terminals for above 15kw external brake kits
(+)、PB	Brake resistor wiring terminals	11KW and below, the brake resistor connected points

P、(+)	Add reactor wiring terminals outside	Add reactor connect point outside
U、V、W	The frequency inverter output terminals	Connect 3-phase motor
⏚	Earth terminal	Earth terminal

2) Wiring Notes:

A. Input Power R、S、T：

The frequency inverter's input side wiring is not requirements in phase order.

B. DC bus terminals (+), (-)

☞Notice：Wiring can only be done after the drive's AC power is cut off, then waiting for at least 5mins and confirming the voltage between DC bus terminals plus and minus is below DC 36V.

When choosing external braking kits more than 15KW for frequency inverter, do not mistake the terminals (+),(-), otherwise, can lead to the drive damage and fire.

When the cables from the frequency inverter to motor are longer than 10m, multi-stranded cables or close two-lane parallel wiring should be used.

Braking resistor can not be directly connected to the DC bus, otherwise, cause the risk of the drive damage and fire.

C. Brake resistor terminals (+), PB:

Less than 11KW, after confirming the drives have built-in brake kits, the braking resistor terminals are effective.

Selection of braking resistor should refer to the recommended value, and wiring distance should be less than 5m. so as to reduce the risk of the drive damage.

D. Add reactor connect terminal outside P, (+):

G37/P45kW ~ G400/P450kW frequency inverter, adding reactor outside , remove the

connected piece between P and (+), then connect the reactor to the two terminals.

E. Frequency Inverter Output Side U. V. W :

The capacitors or surge absorbers can not be connected to the output side of the drive. Otherwise cause the frequency inverter to trip frequently or even be damaged.

Because motor cable is too long, the impact of distributed capacitance produces electrical resonance, which led to the damage of the motor insulation, the drive triping for a greater leakage current. When the cables from the drive to motor are longer than 100m, a AC input reactor should be used.

F. Earth Terminal ⏚

The terminal must be properly earthed, ground resistance must be less than 0.1Ω. Otherwise, lead to equipment abnormal operation or damaged.

☞Notice : It is prohibited to share the earth terminal E and the power zero line terminal N.

3.2.5 Control Circuit and Wiring

1) VFD-G7main control circuit terminals drawing

TA1	TB1	TC1

V1	S1	S2	S3	S4	S5	S6	COM

V2	10V	GND	FM1	SP1	SP2	PW	24V

2) Function of the control terminals

Table 3-3 VFD-G7 Frequency inverter control terminal introduction

The main control circuit terminals			
Type	Terminal Symbol	Terminal Name	Function

The main control circuit terminals			
Type	Terminal Symbol	Terminal Name	Function
Power	10V-GND	External connection+10v power	Provide +10V power for outside, Normally used as working power of the external potentiometer, potentiometer resistance range: 1KΩ ~ 5KΩ Max output current: 10mA
	24V-COM	External connection+24v power	Provide +24 V power for outside, generally used as the power of digital input and output terminals and external transducers. Max output current: 200mA
	PW	External input power	The user could directly connect the power to the external power (with COM), it could also be connected to the +24V power provide by native machine, PW and +24V are regarded as short circuit when delivery. The short circuit plate should be removed if the external power is used.
Analog input	V1-GND	Analog input terminal 1	1.Input voltage range: DC 0V~10V 2. Input resistance: 20KΩ
	V2-GND	Analog input terminal 2	1. Input range: DC 0V~10V or 4mA~20mA, Selected by jumper "JP2" on the control board. 2. Input resistance: input voltage 20KΩ, input current 500Ω.

The main control circuit terminals			
Type	Terminal Symbol	Terminal Name	Function
Digital input	S1-COM	Multi-function digital input terminal 1	1. Opto-coupler isolation 2. Input resistance: 3.3 KΩ 3. Input voltage range: 9V~30V 4. Programmable multi-function input
	S2-COM	Multi-function digital input terminal 2	
	S3-COM	Multi-function digital input terminal 3	
	S4-COM	Multi-function digital input terminal 4	
	S5-COM	Multi-function digital input terminal 5	
	S6-COM	Multi-function digital input terminal 6	
Analog output	FM1-GND	Analog output 1	Output voltage or current could be selected by the JP9 jumper of the control board. Output voltage range: DC 0V~10V Output current range: DC 0~20mA
Digital output	SP1-24V	Digital output 1	Open collector output Output voltage range: DC 0V~24V
	SP2-24V	Digital output 2	Max output current is 50mA.

The main control circuit terminals			
Type	Terminal Symbol	Terminal Name	Function
Relay output	TA1-TB1 TA1-TC1	Normal close/ open terminals	Relay output. TA1-TB1 normal close, TA1-TC1 normal open Contact capacity: AC 250V/3A, DC 30V/1A

3) Explain of jumper

Jumper No.	Description
JP2	Analog input V2 signals Choose DC 0V ~ 10V or 4 ~ 20mA input
JP9	Analog input FM1 signals Choose DC 0V ~ 10V or 0 ~ 20mA output

4) Control terminals:

A. Analog wiring description of intput terminals:

A. Analog intput terminals

Weak analog voltage signal is particularly vulnerable to external interference, so it is generally necessary to use as short as possible shielded cable, wiring is less than 20m, shown in Fig.3-5. When analog signal is seriously interfered in some occasion, a filter capacitors or a ferrite cores should be used in the analog signal source side, shown in Fig.3-6.

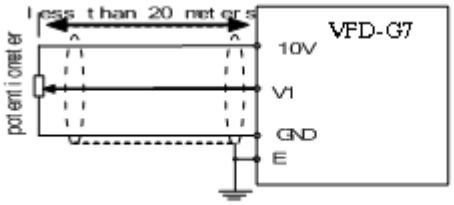


Figure 3-5 Analog input terminal wiring diagram

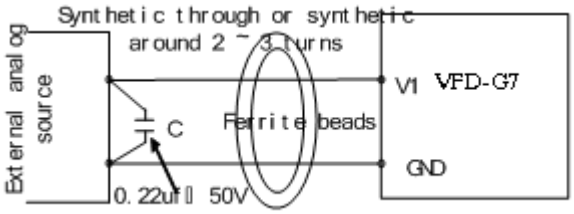


Figure 3-6 Analog input terminal treatment wiring diagram

B. Digital input terminals

It is generally necessary to use as short as possible shielded cable, less than 20m

C. Digital output terminals

When the digital output terminals need to drive the relay, the absorb diode should be installed on both sides of the relay's coil. Otherwise to cause damage of the DC 24V power.

☞Note: The polarity of the absorb diode must be installed properly, shown in fig.3-7. Otherwise, when the digital output terminal has output signal, immediately the 24V DC power supply will burn out.

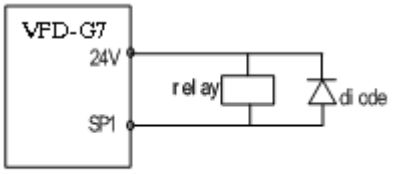


Figure 3-7 Digital output terminal treatment wiring diagram

D. Output terminals of the relay:

When the relay output terminals need to control AC contactors and other inductive load. RC snub device such as over-voltage suppressors, which can be bought from the AC contactor manufacturers or the company should be used on both sides of the contactor's coils. Otherwise the drive is easily disturbed and tripping. Shown in fig.3-8.

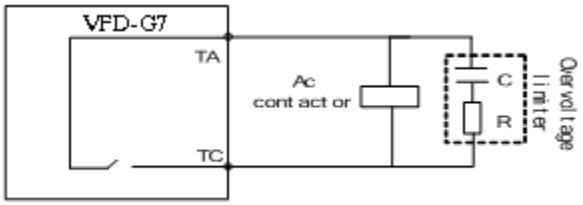


Figure 3-8 Relay output terminal treatment wiring diagram

Chapter 4 Keyboard Operation and Display

4.1 Introduction Of Keyboard Operation And Display Interface

Through the keyboard operation panel, we could modify the functional parameter to the frequency inverter, monitor the working condition of the frequency inverter and perform the operational control (start, stop) of frequency inverter, its outline and functional zone are as follows.

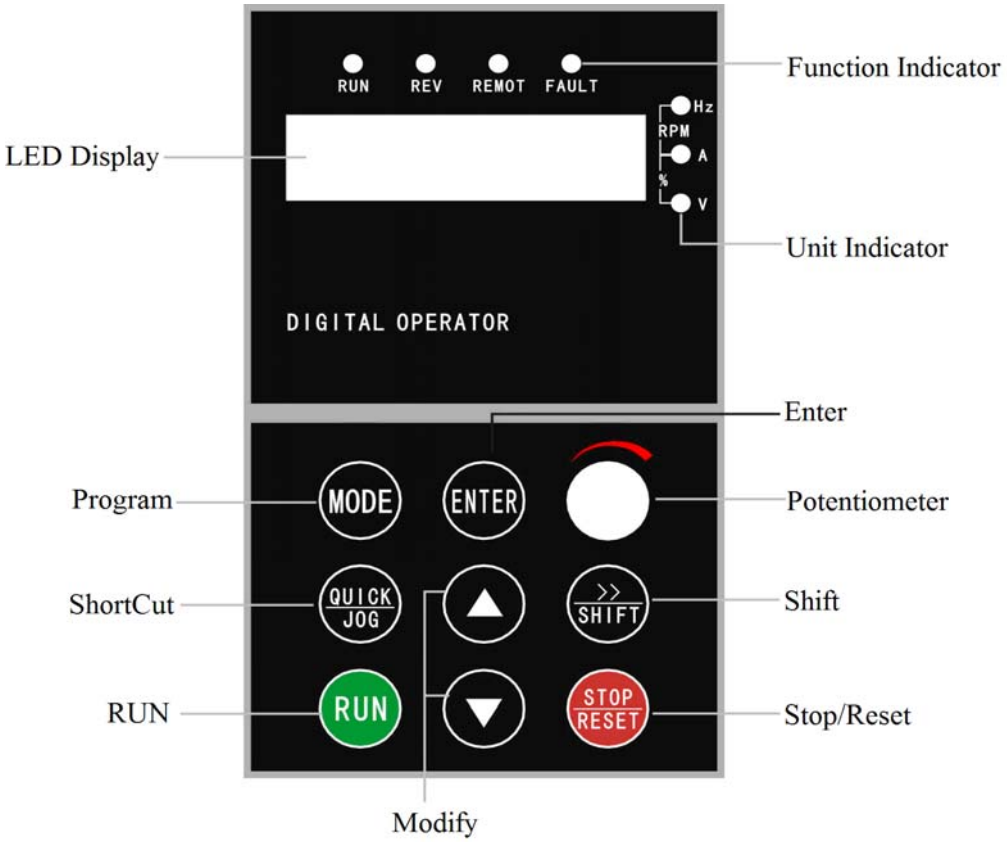


Fig.4-1 Illustration of operation panel

4.1.1 Descriptions of Key Function

There are 8 keys on the operation panel of the inverter and the function of each key is shown in Figure 4-1.

Figure 4-1 VFD-G7 Frequency Inverter Keyboard Operation Illustration

Key Symbol	Name	Function
MODE	Program key	Enter/exit the first level menu
ENTER	Data input key	Enter lower level menu or confirm data
▲	Up/ Increase key	Increase data or function code
▼	Down/Decrease key	Decrease data or function code
>> SHIFT	Right shift key	When modifying the parameter, the modified bit of the parameter could be selected, in the stop display interface and the running display interface, the display parameters could be selected in cycle.
RUN	Run key	In keyboard operation mode, it is used to perform operation, press this key and STOP/RESET in the same time, the frequency inverter will Coast-to-stop.
STOP RESET	Stop/Reset key	In running status, pressing this key to stop, The function is constrained by the function code F9.00 decade; In fault alarm status, all control mode could be false reseted by this key.
QUICK JOG	Multi-function shortcut key	The function is determined by the unit of the function code F9.00. 0: Inching operation; 1: Switch between forward and reverse; 2: Clear the UP/DOWN Setting 3: Main and Auxiliary frequency source switch 4: Torque control stop/effective switch

4.1.2 Descriptions of Function Indicators

The operation panel consists of 4 function indicators and 5 unit indicators, the indicative meaning of each indicator is as shown in the following table.

1. Descriptions of Function Indicators

Indicator Name	Descriptions of Indicator
RUN	Running Status Indicator OFF: The inverter is in halt mode FLASH: The inverter is in parameters self-learning mode or sleep standby mode. ON: The drive is in running mode
REV	Forward/Reverse Indicator OFF: Forward ON: Reverse
REMOT	Running Channel Indicator OFF: Keyboard control mode FLASH: The terminals control mode ON: Remote communication control mode
FAULT	Fault Warning Indicator OFF: Normal FLASH: Warning mode ON: Fault status

2. Descriptions of unit indicators:

Sign	Descriptions
Hz	Frequency unit, Flash: running frequency
A	Current unit
V	Voltage unit
RPM	Rotating speed unit

%	Percentage

3. Digital Display Area

Five LED display could display the setting frequency, output frequency, all kinds of monitoring data and alarm code.

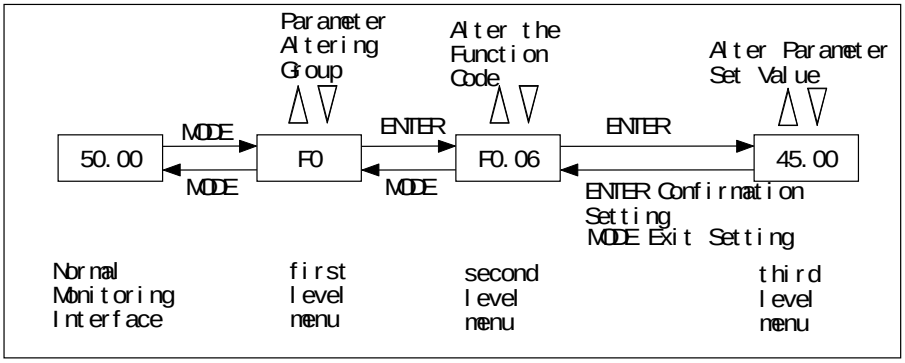
4.2 Power On State

After start-up, first, the system of the inverter begins to initialize, the LED will display 8.8.8.8.8, and the 7 indicators all is ON. When finishes the initialization, the drive enter the Standby status.

4.3 Descriptions of Function Code Check and Modification Method

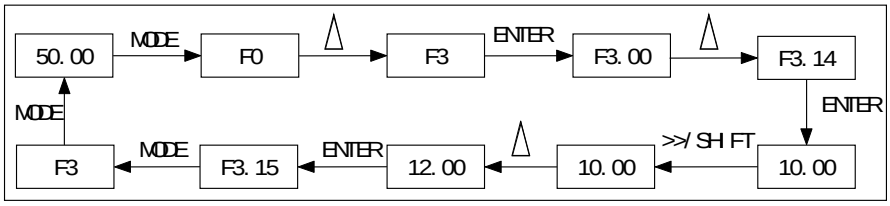
The operation panel of VFD-G7 frequency inverter adopts three-level menu structure to set the parameter.

Three-level menu consists of functional parameter group (first level menu) →Function code (second level menu) →Function code set value(third level menu). The operation procedure is as the follow figure:



Notes: In the operation of third level menu, both MODE and ENTER could be back to second level menu, the difference is that the ENTER key could be back to the second level menu after saving the setting parameter and then transfer to the next function code automatically, but for the MODE key, it would be back to the second level menu directly without saving the parameter and be back to the current function code.

For example: altering the function code F3.14 from 10.00Hz to 12.00Hz.



In the Third level menu state, if the parameter is without flash bit, it indicates that the function code couldn't be modified, it may be caused by the following reasons:

1) The function code is non-modifiable parameter, such as actual monitoring parameter and run recording parameter and so on.
2) The function code is in the process of running, it couldn't be modified and only could be modified after stop.

The operation panel can do a lot of operations, such as: set the parameters, reset the faults, auto-learn the motor's parameters, set the password, display the running state and so on, we would introduce all kinds of operation method and procedure in the following.

4.4 Checking Method of State Parameter

The user could select the stop normal monitoring variable by setting F9.01 and select the running normal monitoring variable by setting F9.02. When the frequency inverter is powered after the power failure, the shown parameter is defaulted as the selected parameter before power failure.

In the stop or run state, the following 6 variables could be shown in cycle by the shift key >>/SHIFT : run frequency (Hz light is flash), setting frequency (Hz light is on), busbar voltage, output current, output voltage, running rotate speed.

The FF group parameter is the real time monitoring variable group, which is used to display the value of the corresponding variable in real time.

If there is no any pressing key within one minute, it would be back to the normal monitoring interface.

4.5 Password Setup

The frequency inverter is with the user password protection function, when the F9.03 is not zero, the user password setting is valid, 1 minute after exiting the function code editing state,

and if pressing the MODE key to enter function code editing state, the LED will display 0.0.0.0.0. , the operator must input the user password rightly, or the operator couldn't enter. If the user wants to cancel the password setting, they need to input the right user password and then set F9.03 to 0.

Notes: please set the password cautiously and bear the password in mind, the system fault would be caused if improper operation.

4.6 Faults Reset

In the fault status, the inverter will display the related fault information. The user could reset the fault through STOP/RESET key in the keyboard or multi-function input terminal, after the frequency inverter is fault reset, it will be in standby state. If the frequency inverter is still in fault state, it indicates that the user need to check the fault of the frequency inverter carefully and it would fault reset after finding the fault reasons and solving the problem.

4.7 Auto-learning of Motor Parameters

The V/F control mode (F0.14=1) is advised for the square-torque load (Fans and water pump type), other constant torque load can use the vector control mode (F0.14=0). If the vector control operating mode is selected, the motor's nameplate parameters must be exactly input, the inverter will match the standard motor parameters according to the nameplate parameters.

In order to obtain a good control performance, auto-learning motor's parameters is advised, the auto-learning steps is shown in the follow:

Firstly, select the start and stop signal to panel start and stop (F0.12=0) , then input the follow parameters according to the motor's nameplate:

F0.16: The motor' rated voltage.

F0.17: The motor's rated frequency;

F3.00: The motor's rated power;

F3.01: The motor's rated current ;

F3.02: The motor's rated rotate speed.

The motor's parameters auto-learning have dynamic auto-learning and static auto-learning, the procedure is as follows:

1. Parameter dynamic auto-learning

The parameter dynamic auto-learning can be finished during the motor running, the Acc-time(F0.10) and Dec-time (F0.11) must be reasonably set according to the motor's power, otherwise, if the Acc and Dec time is too short, it would cause over-current in the process of dynamic auto-learning.

First, set the F3.08=1, the panel will display –TUN-, then press the RUN key, the inverter begins to parameter dynamic auto-learn. During the process, the panel will display TUN-0, TUN-1 in turn, when the panel displays -END-, the learning process is over and success. If the drive displays the fault code E020 after the auto-learning, it indicates that mistakes occur to the dynamic parameter auto-learning, the learning process is failure, please confirm the input motor parameters and redo the steps.

☞Note: During the parameter dynamic auto-learning process, the motor and the load should completely disconnect and proceed when the motor stops steadily, otherwise, the obtained motor parameters maybe incorrect. The dynamic auto-learning is advised as far as possible. In case that the motor and the load can not be completely disconnected by the limitation of the scene, the static auto-learning can be used.

2. Parameter Static auto-learning

The static auto-learning can be done when the motor is still. First, set the F3.08=2, the panel will display –TUN-, then press RUN key, now the drive begins to statically auto-learn. During the process, the panel will display TUN-0, when the panel displays -END-, the learning process is over and success. If the drive displays the fault code E020, it indicates that mistakes occur to the static parameter auto-learning, the learning process is failure, please confirm the motor's parameters and redo the steps.

Chapter 5 Function Parameter Simple List

The function parameters of VFD-G7 series frequency inverter are organized in groups. And there are 16 groups from F0-FF. Each function group consists of several function codes that are identified by “Function Group No. + Internal Code Number”. For example, “F2.01” indicates group 2 and its function code is 1.

☞Notice 1: It could be used to any load and you should setup F0.16、F0.17 according to the motor’s nameplate.

☞Notice 2 ：VFD-G7 series frequency inverters before factory is type G (apply to general used load). If the frequency inverter is used as type P with a large gear (used to the fan and water pump load), the function code F0.15 must be set to 1.

☞Notice 3：VFD-G7 series frequency inverter before factory is V/F control. If the case needs a big torque, F0.14 can be set to 0 (available to <G200/P220KW, for vector control), but F3.00 to F3.02 must be setup according to the motor’s nameplate, then the drive auto-learns the motor’s parameters

☞Notice 4: “√” Indicates the parameter can be modified, no matter the drive runs or stops; “×” means the parameter can not be modified while the drive is running. “□” indicates the parameter can only be read.

Table1 Function Parameter Simple List

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
Group F0: Basic Running Parameters Group					
F0.00	Selection of the main frequency source	0: Keyboard digital frequency setting 1：Analog V1 setting 2：Analog V2 setting 3: Keyboard	3	×	93
F0.01	Selection of the auxiliary frequency source		0	×	93

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		potentiometer setting 4 : Multi-segment speed running setting 5 : PID control setting 6: Remote communication setting 7 : PLC program running setting 8 : HDI high-speed pulse setting			
F0.02	Auxiliary frequency source standard selection when overlay	0: Relative to maximum frequency 1: Relative to main frequency source	0	√	94
F0.03	Auxiliary Frequency Scope overlay	0.0 ~ 150.0%	100.0%	√	94
F0.04	Main and auxiliary frequency combination mode	0 : Only main frequency setting 1: Only auxiliary frequency setting 2: QUICK/JOG or terminal switching selection 3: Main frequency + auxiliary frequency (the direction is decided by main frequency)	0	√	94

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		4: Main frequency - auxiliary frequency (the direction is decided by main frequency) 5 : The maximum of both (the direction is decided by main frequency) 6 : The minimum of both (the direction is decided by main frequency)			
F0.05	Maximum output frequency	F0.06(minmum5.00Hz) ~ 600.00Hz	50.00 Hz	×	95
F0.06	Running frequency upper limit	F0.07 ~ F0.05	50.00 Hz	√	95
F0.07	Running frequency lower limit	0.00 ~ F0.06	0.00 Hz	√	95
F0.08	Keypad digital frequency setting	0.00 ~ F0.05	50.00 Hz	√	95
F0.09	Running direction setting	0: Forward running 1: Reverse running 2: Reverse forbidden	0	×	95
F0.10	Acceleration time 0	0.1 ~ 3600.0s	Type confirm	√	96
F0.11	Deceleration time 0	0.1 ~ 3600.0s	Type confirm	√	96
F0.12	Operation channel	0: Keyboard start-stop	0	×	96

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
	selection	(“REMOT” light is off)； 1: Terminal start-stop (“REMOT” light is flash)）； 2: Communication start-stop (“REMOT” light is on , need support of expansion cards SC-EXT-IO ）			
F0.13	Terminal Control Running Mode	0 :Two wire type control 1 1 :Two wire type control 2 2 : Three wire type control 1 3 : Three wire type control 2 4 : Three wire type control 3	0	×	97
F0.14	Control mode	0: No PG speed vector control； 1：VF control； 2: No PG torque control	1	×	100
F0.15	Model type selection	0：G Type 1: P Type	0	×	100
F0.16	Motor rated voltage	20～2000V	380V	×	101
F0.17	Motor rated frequency	5.00～F0.05	50.00Hz	×	101

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
F0.18	Expansion cards type	0：No expansion cards 1: Standard expansion cards SC-EXT1-IO 2: Relay expansion cards SC-EXT2-R 3: Multifunctional input expansion card SC-EXT3-S	0	×	101
F0.19	UP/DOWN Setting	Unit Digit： 0：Invalid 1: Only valid for keyboard digital frequency setting Decade： 0: No storage when powering down 1: Storage when powering down： 0：Zero clearing when stop 1: No zero clearing when stop	0111H	√	101
F0.20	UP/DOWN change rate	0.01～100.00Hz/s	1.00Hz/s	√	102
F0.21	Modulation function selection	The single digit : AVR automatic voltage regulation 0：Invalid	0000H	√	102

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		1: Valid for whole course 2: Only invalid for deceleration Decade：Reserve Hundreds: PWM choose 0：PWM mode 1 1：PWM mode 2 Thousand：Auto-saving 0：Invalid 1：Valid			
F0.22	Carrier frequency	0.5～15.0 kHz	Type confirm	√	103
F0.23	Voltage of energy consumption brake valve	115.0 ～ 140.0%(standard busbar voltage)	130.0% (380V series) 120.0% (220V series)	√	104
F0.24	Given frequency is less than frequency lower Limit	0: Run in lower limit frequency 1：Run in zero frequency 2：Standby state	0	√	104

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
F0.25	Holding time of zero frequency runtime output voltage	0.0～6553.5s	3600.0s	√	105
F0.26	Software version			○	105
F0.27	Parameter initialization	0：No-operation 1: Recover the factory settings 2: Clear the fault record	0	×	105
F1 group: Start/stop Control Parameter Group					
F1.00	Start function choice	The single digit : start mode selection 0: Direct-on starting 1: DC braking first, then start Decade：Reserve Hundreds: Terminal control, restart choice when power-off 0: The terminal operation command is invalid when power-on 1: The terminal operation command is valid when power-on Thousands: Restart selection after power cut	0000H	×	105

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		in keyboard control 0：No restart 1：Allow auto-restart			
F1.01	Directly start frequency	0.00～10.00Hz	0.00Hz	√	107
F1.02	Start frequency holding time	0.0～50.0s	0.0s	√	107
F1.03	DC braking current at start	0.0～150.0%	0.0%	√	107
F1.04	DC braking time at start	0.0～50.0s	0.0s	√	107
F1.05	Stopping function selection	The single digit：stopping mode choice 0: Dec to stop 1: Coast to stop Tens: stopping DC braking use enabled 0：Disable 1: Enable, DC braking start frequency decided by F1.06 2: Enable, DC braking start frequency decided by external terminal	0010H	×	108
F1.06	Stopping braking start frequency	0.00 Hz～ F0.05	0.00Hz	√	108

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
F1.07	Stopping braking waiting time	0.0～50.0s	0.0s	√	108
F1.08	Stopping DC braking current	0.0～150.0%	0.0%	√	108
F1.09	Stopping DC braking time	0.0～50.0s	0.0s	√	108
F1.10	Power cut restart waiting time in keyboard control	0.0～6553.5s	1.0s	√	109
F1.11	The drop point of frequency for trip-free	70.0% ～ 110.0%(standard bus voltage)	80.0%	√	109
F1.12	Frequency decrease rate at trip-free	0.00～50.00Hz/s	0.00Hz/s	√	109
F2 Group: VF Control Parameter Group					
F2.00	V/F curve setting	0：Linear V/F curve 1: 2.0 times power drop torque V/F curve； 2: Custom V/F percentage； 3：Multipoint VF curve	0	×	110
F2.01	Torque boost	0.0: Auto-torque boost 0.1:～30.0%	0.0%	√	111
F2.02	Cut-off frequency of torque boost	0.0 ～ 50% (Rated frequency of motor)	20.0%	×	111

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
F2.03	VF point 1 frequency F1	0.1 ~ F2.05	20.0%	√	112
F2.04	VF point 1 voltage V1	0.1 ~ F2.06	20.0%	√	112
F2.05	VF point 2 frequency F2	F2.03 ~ F2.07	50.0%	√	112
F2.06	VF point 2 voltage V2	F2.04 ~ F2.08	50.0%	√	112
F2.07	VF point 3 frequency F3	F2.05 ~ 100.0% (rated frequency of motor)	70.0%	√	112
F2.08	VF point 3 voltage V3	F2.06 ~ 100.0% (rated voltage of motor)	70.0%	√	112
F2.09	Custom V/F percentage	50.0 ~ 100.0%	100.0%	√	113
F2.10	V/F Slip compensation gain	0.0 ~ 200.0%	0.0%	√	113
F2.11	Suppress oscillation enabled	0: Enabled 1: Disabled	1	√	113
F2.12	Suppress oscillation low-frequency threshold	0 ~ 500	5	√	113
F2.13	Suppress oscillation high-frequency	0 ~ 500	100	√	114

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
	threshold				
F2.14	Amplitude limit of suppress oscillation	0 ~ 10000	5000	√	114
F2.15	Boundary frequency between high and low frequency of suppress oscillation	0.00 ~ F0.05	12.50Hz	√	114
F3 Group: Vector And Torque Control Parameter Group					
F3.00	Rated power of motor[1)]	0.4 ~ 900.0kW	Type confirm	×	114
F3.01	Rated current of motor[1)]	0.4 ~ 1000.0A	Type confirm	×	114
F3.02	Rated rotating speed of motor[1)]	0 ~ 36000RPM	Type confirm	×	114
F3.03	Resistance of stator [1)]	0.001 ~ 65.535Ω	Type confirm	√	115
F3.04	Resistance of rotor[1)]	0.001 ~ 65.535Ω	Type confirm	√	115
F3.05	Leakage inductance of stator and rotor	0.1 ~ 6553.5 mH	Type confirm	√	115
F3.06	Exciting inductance of	0.1 ~ 6553.5 mH	Type confirm	√	115

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
	stator and rotor [1)]				
F3.07	Current without load [1)]	0.1 ~ 6553.5A	Type confirm	√	115
F3.08	Parameter auto-learning	0: Disabled 1: Enabled (motor is running) 2: Enabled (motor in standstill state)	0	×	115
F3.09	Proportional gain 1 of speed-loop	0.0 ~ 100	20	√	116
F3.10	Integral gain 1 of speed-loop	0.0 ~ 10.00s	0.50s	√	116
F3.11	The low frequency point to switch	0.0 ~ F3.14	5.00 Hz	√	116
F3.12	Proportional gain 2 of speed-loop	0.0 ~ 100	25	√	117
F3.13	Integral gain 2 of speed-loop	0.0 ~ 10.00s	1.00s	√	117
F3.14	The high frequency point to switch	F3.11 ~ F0.05	10.00Hz	√	117
F3.15	Coefficient of VC Slip compensation	0 ~ 200%	100%	√	117
F3.16	The upper limit of VC torque	~ 200.0% the rated current of frequency inverter	150.0%	√	117

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
F3.17	Choice of torque setting mode	0: Keypad digital frequency setting 1：Analogue V1 setting 2：Analogue V2 setting 3: Keypad potentiometer setting 4: Telecommunication setting	0	√	118
F3.18	Keypad digital torque setting	-100.0～100.0% （100.0% the corresponding torque upper-limit）	50.0%	√	118
F3.19	The source of setting upper limit frequency selection	0: Keypad sets upper-limit frequency(F0.06) 1: Analog V1 sets upper-limit frequency 2: Analog V2 sets upper-limit frequency 3: Telecommunication sets upper-limit frequency	0	√	118
F4：Input Signal Group					
F4.00	S1 terminal function selection	00: No function 01: Forward 02: Reverse 03: 3-wire operation	1	×	119
F4.01	S2 terminal function selection		2	×	119

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
F4.02	S3 terminal function selection	control 04：Jog forward 05：Jog reverse 06：Free parking 07：Fault reset 08：External fault input 09: Increase frequency (UP) 10: Decrease frequency (DOWN) 11：Clear the 09 and 10 12：Multi-speed terminal 1 13：Multi-speed terminal 2 14：Multi-speed terminal 3 15：Multi-speed terminal 4 16：Pause PID control 17：Pause traverse (hold the current frequency) 18：Traverse reset (return the central frequency) 19：Acc/Dec Pause 20：Disable torque control （under torque control, force to switch speed control）	7	×	119
F4.03	S4 terminal function selection		0	×	119
F4.04	S5 terminal function selection		0	×	119
F4.05	S6 terminal function choice		0	×	119
F4.06	S7 terminal function selection		0	×	119
F4.07	S8 terminal function selection		0	×	119
F4.08	S9 terminal function selection		0	×	119
F4.09	S10 terminal function selection		0	×	119

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		21: Temporarily clear the frequency UP or DOWN setting 22: Clear the memorized information of PLC operation 23：Acc/Dec time choice 24: Auxiliary frequency source selection 25: Pause Simple PLC program running 26：Reserve 27：Reserve 28: Stopping DC braking trigger 29：Reserve 30：Reserve			
F4.10	Filter times of the switch	1～10	5	√	123
F4.11	V1 low-limit	0.00 ～F4.13	0.00V	√	123
F4.12	The reference value corresponding to lower limit of V1	-100.0 ～100.0%	0.0%	√	123
F4.13	V1 Upper limit	F4.11 ～10.00V	10.00V	√	123

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
F4.14	The reference value corresponding to upper limit of V1	-100.0 ~ 100.0%	100.0%	√	123
F4.15	Filter time of input V1	0.00 ~ 10.00s	0.10s	√	123
F4.16	V2 Lower limit	0.00 ~ F4.18	2.00V	√	124
F4.17	The reference value corresponding to lower limit of V2	-100.0 ~ 100.0%	0.0%	√	124
F4.18	V2 Upper limit	F4.16 ~ 10.00V	10.00V	√	124
F4.19	The reference value corresponding to upper limit of V2	-100.0 ~ 100.0%	100.0%	√	124
F4.20	Filter time of input V2	0.00 ~ 10.00s	0.10s	√	124
F4.21	HDI rapid pulse frequency low-limit	0.00 ~ F4.23	0.00 kHz	√	124
F4.22	HDI low-limit frequency corresponding setting percentage	-100.0 ~ 100.0%	0.0%	√	124

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
F4.23	HDI rapid pulse frequency upper-limit	F4.21 ~ 50.00kHz	50.00 kHz	√	124
F4.24	HDI upper-limit frequency corresponding setting percentage	-100.0 ~ 100.0%	100.0%	√	125
F5：output signal group					
F5.00	SP1 output choice	00：No output 01: Frequency inverter is running 02：Frequency inverter is ready（Stop trouble-free） 03: Frequency inverter Fault 04: Frequency detection output FDT 05: Reference frequency arriving (FAR) 06：Zero-speed running 07: Frequency high limit arriving 08: Frequency low limit arriving	1	√	125
F5.01	SP2 output choice		2	√	125
F5.02	Relay 1 output choice		3	√	125
F5.03	Relay 2 output choice		0	√	125
F5.04	Relay 3 output choice		0	√	125

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
F5.05	Relay 4 output choice	09：PLC phase complete output 10: PLC cycle time complete output 11：DC braking process 12: Torque detection output FDT 13：Reserve 14：Reserve 15：Inverted running 16：Reserve 17: One drives two cycling and 1# pump variable frequency operation 18: One drives two cycling and 1# pump power frequency operation 19: One drives two cycling and 2# pump variable frequency operation 20: One drives two cycling and 2# pump power frequency operation 21: The status of input terminal S1	0	√	125
F5.06	Relay 5 output choice		0	√	125

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		22: The status of input terminal S2 23: The status of input terminal S3 24: The status of input terminal S4 25: The status of input terminal S5 26: The status of input terminal S6 27: Frequency inverter alarm status 28: frequency inverter sleep status 29: Braking unit action process 30：Reserve			
F5.07	SP1 closing delay time	0.0～6553.5s	0.0s	√	127
F5.08	SP1 cutting delay time	0.0～6553.5s	0.0s	√	127
F5.09	SP2 closing delay time	0.0～6553.5s	0.0s	√	127
F5.10	SP2 cutting delay time	0.0～6553.5s	0.0s	√	127
F5.11	Relay 1 TABC output closing	0.0～6553.5s	0.0s	√	127

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
	delay time				
F5.12	Relay 1 TABC output cutting delay time	0.0 ~ 6553.5s	0.0s	√	127
F5.13	FAR duration width	0.0 ~ 100.0% (Maximum output frequency)	0.0%	√	127
F5.14	FDT electrical detection value	00.00 ~ F0.05	50.00Hz	√	128
F5.15	FDT lag detection value	000.0 ~ 100.0%(FDT level)	5.0%	√	128
F5.16	FDT torque level value	0.0 ~ 250.0%	100.0%	√	129
F5.17	FDT Torque level detection lagged value	0.0 ~ 100.0%	5.0%	√	129
F5.18	FM1output choice	00：Operating frequency 01：Setting frequency 02：Bus voltage 03：Output current 04：Output voltage 05：Operating speed 06：Output power 07：Setting torque 08：Output torque 09：PID setting	0	√	129
F5.19	FM2 output choice		3	√	129
F5.20	HDO rapid pulse output choice		1	√	129

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		10：PID feedback 11：Analog input V1 12: Analog input V2 13: HDI rapid pulse input choice 14: Potentiometer VR input 15：Reserve			
F5.21	Lower limit percentage of output FM1	0.0～100.0%	0.0%	√	130
F5.22	The output correspondences the FM1 Lower limit	0.00～10.00V	0.00V	√	130
F5.23	Upper limit percentage of output FM1	0.0～100.0%	100.0%	√	131
F5.24	The output correspondences the FM1 upper-limit	0.00～10.00V	10.00V	√	131
F5.25	FM2 output Lower limit percentage	0.0～100.0%	0.0%	√	131
F5.26	The output correspondences the FM2 Lower	0.00～10.00V	0.00V	√	131

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
	limit				
F5.27	FM2 output upper limit percentage	0.0 ~ 100.0%	100.0%	√	131
F5.28	The output correspondences the FM2 upper limit	0.00 ~ 10.00V	10.00V	√	132
F5.29	HDO rapid pulse output low-limit percentage	0.0 ~ 100.0%	0.0%	√	132
F5.30	The output correspondences the HDO low-limit	0.00 ~ 50.00kHz	0.00 kHz	√	132
F5.31	HDO rapid pulse output upper-limit percentage	0.0 ~ 100.0%	100.0%	√	132
F5.32	The output correspondences the HDO upper-limit	0.00 ~ 50.00kHz	50.00 kHz	√	132
F6：Multi-speed and PLC Program Operation					
F6.00	PLC phase 0/ Multi-speed 0 target	-100.0 ~ 100.0%	0.0%	√	132
F6.01	PLC phase 1/ Multi-speed 1 target	-100.0 ~ 100.0%	0.0%	√	132

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
F6.02	PLC phase 2/ Multi-speed 2 target	-100.0 ~ 100.0%	0.0%	√	132
F6.03	PLC phase 3/ Multi-speed 3 target	-100.0 ~ 100.0%	0.0%	√	132
F6.04	PLC phase 4/ Multi-speed 4 target	-100.0 ~ 100.0%	0.0%	√	133
F6.05	PLC phase 5/ Multi-speed 5 target	-100.0 ~ 100.0%	0.0%	√	133
F6.06	PLC phase 6/ Multi-speed 6 target	-100.0 ~ 100.0%	0.0%	√	133
F6.07	PLC phase 7/ Multi-speed 7 target	-100.0 ~ 100.0%	0.0%	√	133
F6.08	PLC phase 8/ Multi-speed 8 target	-100.0 ~ 100.0%	0.0%	√	133
F6.09	PLC phase 9/ Multi-speed 9 target	-100.0 ~ 100.0%	0.0%	√	133
F6.10	PLC phase 10/ Multi-speed 10 target	-100.0 ~ 100.0%	0.0%	√	133

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
F6.11	PLC phase 11/ Multi-speed 11 target	-100.0 ~ 100.0%	0.0%	√	133
F6.12	PLC phase 12/ Multi-speed 12 target	-100.0 ~ 100.0%	0.0%	√	133
F6.13	PLC phase 13/ Multi-speed 13 target	-100.0 ~ 100.0%	0.0%	√	133
F6.14	PLC phase 14/ Multi-speed 14 target	-100.0 ~ 100.0%	0.0%	√	133
F6.15	PLC phase 15/ Multi-speed 15 target	-100.0 ~ 100.0%	0.0%	√	133
F6.16	PLC phase 0 operation time	0.0 ~ 6500.0s	0.0s	√	133
F6.17	PLC phase 1 operation time	0.0 ~ 6500.0s	0.0s	√	133
F6.18	PLC phase 2 operation time	0.0 ~ 6500.0s	0.0s	√	133
F6.19	PLC phase 3 operation time	0.0 ~ 6500.0s	0.0s	√	134
F6.20	PLC phase 4 operation time	0.0 ~ 6500.0s	0.0s	√	134
F6.21	PLC phase 5	0.0 ~ 6500.0s	0.0s	√	134

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
	operation time				
F6.22	PLC phase 6 operation time	0.0 ~ 6500.0s	0.0s	√	134
F6.23	PLC phase 7 operation time	0.0 ~ 6500.0s	0.0s	√	134
F6.24	PLC phase 8 operation time	0.0 ~ 6500.0s	0.0s	√	134
F6.25	PLC phase 9 operation time	0.0 ~ 6500.0s	0.0s	√	134
F6.26	PLC phase 10 operation time	0.0 ~ 6500.0s	0.0s	√	134
F6.27	PLC phase 11 operation time	0.0 ~ 6500.0s	0.0s	√	134
F6.28	PLC phase 12 operation time	0.0 ~ 6500.0s	0.0s	√	134
F6.29	PLC phase 13 operation time	0.0 ~ 6500.0s	0.0s	√	134
F6.30	PLC phase 14 operation time	0.0 ~ 6500.0s	0.0s	√	134
F6.31	PLC phase 15 operation time	0.0 ~ 6500.0s	0.0s	√	134
F6.32	PLC function choice	The unit: Cycle mode choice 0 : Stop after operating for 1 cycle (Timing shutdown function can be	0000H	×	135

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		realized） 1：Holding at the final value after single cycle of operation 2：Cycle continuously（Effect after stopping） Tens: PLC breakpoint recovery choice) 0: Run again from phase 1 1：Continue to run from the stopping phase（retiming） 2：Operate at the time and frequency when the drive stops or fault occurs Hundreds: Power-off, PLC situation store 0：No store 1：Store Thousands：phase tome unit 0：S 1: Min			
F6.33	PLC target setting unit choice	0: Percentage setting；1：Frequency setting		×	136
F7：Process PID Parameter Group					

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
F7.00	PID control function choice	The unit: PID given channel selection 0: Keypad digital frequency setting 1：Analog V1 setting 2：Analog V2 setting 3：keypad potentiometer setting 4：Multi-speed operation setting 5: Telecommunication setting 6：HDI rapid pulse setting Tens：PID feedback way choice 0: Analog input V1 feedback 1: Analog input V2 feedback 2: Keypad potentiometer setting 3：Telecommunication setting feedback 4: HDI rapid pulse feedback Hundreds: PID output feature choice 0: PID output positive	0000H	√	137

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		characteristic 1: PID input negative characteristic			
F7.01	Feedback signal protect function choice	The unit: Feedback disconnection detected selection 0：Disable 1：Alarm and operation in settled frequency 2：Breakdown(E022) Tens: Feedback over-voltage protect choice 0: Disable 1: Alarm and operation in settled frequency 2: Breakdown(E024)	0000H	√	138
F7.02	Reference PID preset of keypad	0.0～100.0%	0.0%	√	138
F7.03	Proportional gain	0.00～ 50.00	5.00	√	138
F7.04	Integral time	0.01～ 50.00s	0.40s	√	138
F7.05	The limit of PID control slip	0.0～100.0%	0.0%	√	138
F7.06	The value of feedback disconnection	0.0～100.0%	0.0%	√	139

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
	detected				
F7.07	Feedback disconnection detected time	0.0～ 3600.0s	10.0s	√	139
F7.08	Feedback disconnection alarm operation settled frequency setting	0.00～F0.05	25.00Hz	√	139
F7.09	Sleep frequency	F0.07～ F0.05	0.00Hz	√	139
F7.10	Sleep delay	0.0～3600.0s	120.0s	√	139
F7.11	Wakeup value	0.0～100.0%	10.0%	√	139
F7.12	Wakeup delay	0.0～3600.0s	30.0s	√	140
F7.13	PID feedback big values	20.0～100.0%	100.0%	√	140
F7.14	PID feedback big value time	0.0～3000.0s	3.0s	√	140
F7.15	PID feedback big	0.00～F0.05	0.00Hz	√	140
F8：Communication Parameter Group					
F8.00	Local communication address	0: Broadcast address 1～247	1	√	140
F8.01	Communication allocation	The unit：communication baud rate selection 0：1200BPS	0003H	√	140

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		1：2400BPS 2：4800BPS 3：9600BPS 4：19200BPS 5：38400BPS Tens: Data parity setting 0：No parity (N，8，1)for RTU 1：Even parity (E，8，1)for RTU 2：Odd parity (0，8，1)for RTU 3：No parity (N，8，2)for RTU 4：Even parity (E，8，2)for RTU 5：Odd parity (Q，8，2)for RTU			
F8.02	Delay for responding to control PC	0～200ms	5ms	√	141
F8.03	The fault time of Communication overtime	0.0s（Invalid） 0.1～100.0S	0.0s	√	141
F8.04	Communication response setting	The unit: The fault of communicating mistake 0：Alarm and coast to stop	0001H	√	141

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		1: No alarm and continue running 2: No alarm and stop in stopping mode(only in serial port control mode) 3: No alarm and stop in stopping mode(in all control modes) Tens: The response of communication： 0: Respond for writing 1: No respond for writing			
F9：Human-computer Interface Parameter Group					
F9.00	Key function setting	The unit: Function of QUICK/JOG key 0：Jog operation 1: Switch between forward and reverse 2: Clear the set UP/DOWN 3: Main or auxiliary frequency source switch 4: Torque control prohibit/valid switch Tens: Function of STOP/RST key in stop state 0: Valid for panel	0000H	√	142

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		1: Valid for panel and terminal control in the same time 2: Valid for panel and communication control in the same time 3: Valid for all of the control mode			
F9.01	Normal monitoring parameter selection when stop	00：Operating frequency（Hz light blink） 01：Setting frequency（Hz light） 02：Bus voltage 03：Output current 04：Output voltage 05：Spinning speed 06：Output power 07：Setting torque 08：Output torque 09：PID setting 10：PID feedback 11：Analog input V1 12：Analog input V2 13: HDI rapid pulse input frequency 14: The status of input terminal	1	√	143
F9.02	Normal monitoring parameter selection when running		0		143

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		15：FM1 output voltage 16：FM2 output voltage 17: HDO rapid pulse output frequency 18: The status of output terminal 19: Main or auxiliary frequency source indication 20：UP/DOWN frequency value 21: The current stage of multi-stage 22: PLC program operation present stage 23: Potentiometer input voltage 24: Input current percentage 25：Module temperature 26：Inverse module 27: Operation time accumulation 28: Motor overload percentage 29: Frequency inverter overload percentage 30：Reserve			

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
F9.03	Password [1)]	0 ~ 65535	0	√	143
F9.04	Reserve				144
F9.05	Accumulated the polarization time -hour	H		○	144
F9.06	Accumulated the polarization time-minute	Min		○	144
FA: Enhanced Functional Parameters Group					
FA.00	Jog operation frequency	0.00 ~ F0.05	10.00Hz	√	144
FA.01	Acc time of Jog operation	0.1 ~ 3600.0s	Type confirm	√	144
FA.02	Dec time of Jog operation	0.1 ~ 3600.0s	Type confirm	√	144
FA.03	Acc time 1	0.1 ~ 3600.0s	Type confirm	√	145
FA.04	Dec time 1	0.1 ~ 3600.0s	Type confirm	√	145
FA.05	Run reverse/forward dead time	0.0 ~ 3600.0s	0.0s	√	145
FA.06	Skip frequency	0.00 ~ F0.05	0.00Hz	√	145
FA.07	Range of skip	0.00 ~ F0.05	0.00Hz	√	145

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
	frequency				
FA.08	Traverse operating amplitude	0.0 ~ 100.0%(compared the reference value)	0.0%	√	146
FA.09	Jitter frequency amplitude	0.0 ~ 50.0%(compared traverse operating amplitude)	0.0%	√	146
FA.10	Rising time of Traverse operating	0.1 ~ 3600.0s	5.0s	√	146
FA.11	Dropping traverse operating	0.1 ~ 3600.0s	5.0s	√	146
FA.12	Coefficient of displayed speed	0.0 ~ 1000.0%	100.0%	√	147
FA.13	Reserve				
FA.14	Reserve				
FA.15	Current percentage of speed tracking excitation [1)]	0.0 ~ 200.0%	150.0%	√	147
FA.16	Excitation time [1)]	10 ~ 3000ms	300ms	√	147
FA.17	Speed calculate decision time[1)]	20 ~ 1000ms	200ms	√	148
FA.18	Voltage output soft-start time[1)]	0 ~ 2000ms	250ms	√	148
FB: Protection Function Group					
Fb.00	Protection function choice 1	The unit：Over voltage at stall protect	1101H	√	148

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		0: Disabled 1: Enabled Tens: Current limiting action selection 0: Disabled 1: Enabled Hundreds: Input loss-Phase protection 0: Disabled 1: Enabled Thousands: Output loss-Phase protection 0: Disabled 1: Enabled			
Fb.01	Protection function choice 2	The unit: Overload protection mode selection 0：Unprotected 1：Protection Tens：Limit effective for Fault reset times 0：No limit for fault reset 1: Three consecutive failure in three minute, and allow reset after 3 three minutes Hundreds: Group	0001H	√	149

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		protection 0: Disabled 1: Enabled			
Fb.02	Motor overload protection point	20.0 ~ 120.0%(motor rated current)	100.0%	√	149
Fb.03	Bus-wire over voltage at stall	110 ~ 150%	130%	√	150
Fb.04	Auto current limiting threshold	100 ~ 200%	170%	√	150
Fb.05	Frequency decrease rate in current limiting	0.00 ~ 50.00Hz/s	0.00 Hz/s	√	150
Fb.06	Auto reset times	0 ~ 3	0	√	151
Fb.07	Fault automatic reset interval time set	0.1 ~ 100.0s	1.0s	√	151
Fb.08	Type of third latest fault	E000:No fault E001:IGBT shorted protection	0	○	151
Fb.09	Type of latest fault		0	○	151

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
Fb.10	Current fault type	E004:Over-current in accelerating process E005:Over-current in decelerating process E006:Over-cuttent in constant-speed running process E007:Over-voltage in accelerating process E008:Over-voltage in decelerating process E009:Over-voltage in constant-speed running process E010:DC Bus low-voltage E011:Motor overload	0	○	151
		E012:Drive overload E013:Input phase failure E014:Output phase failure E015:Rectifier Heatsink over-temperature E016:IGBT Heatsink over-temperature E017:External fault E018:Serial port communication fault E019:current detection circuit fault			

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		E020: Motor's parameter auto-learning fault E021:EEPROM w/r error E022:PID feedback disconnected fault E023:Braking bits fault E024:PID feedback voltage oversize fault E025:Reserve			
Fb.11	Operating frequency of current fault		0.00Hz	○	152
Fb.12	Output frequency of current fault		0.0A	○	152
Fb.13	DC bus voltage of current fault		0.0V	○	152
Fb.14	Input terminal state of current fault			○	152
Fb.15	Output terminal state of current fault			○	152
Fb.16	Reserve				152
FC: Apply Parameter Group 1					
FC.00	Reserve				152
FC.01	Reserve				152

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
FC.02	Reserve				152
FC.03	Reserve				152
FC.04	Reserve				152
FC.05	Reserve				152
FC.06	Reserve				152
FD：Apply Parameter Group 2					
Fd.00	Reserve				152
Fd.01	Reserve				152
Fd.02	Reserve				152
Fd.03	Reserve				152
FE: Frequency Inverter Body parameter Group					
FF：Monitoring Parameter Group（This parameter can only be read）					
FF.00	Operation frequency	Unit：0.01Hz		○	152
FF.01	Setting frequency	Unit：0.01Hz		○	152
FF.02	Bus voltage	Unit：0.1V		○	152
FF.03	Output current	Unit：0.1A		○	153
FF.04	Output voltage	Unit：1V		○	153
FF.05	Operation revolving speed	Unit：1RPM		○	153
FF.06	Output power	100.0% corresponding motor rated power		○	153

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
FF.07	Setting torque	100.0% corresponding motor rated torque		○	153
FF.08	Output torque	100.0% corresponding the frequency inverter rated torque		○	153
FF.09	PID setting	0.0 ~ 100.0%		○	153
FF.10	PID feedback	0.0 ~ 100.0%		○	153
FF.11	Analog V1 input	0.00 ~ 10.00V		○	153
FF.12	Analog V2 input	0.00 ~ 10.00V		○	153
FF.13	HDI rapid pulse input	0.01 ~ 50.00kHz		○	153
FF.14	Input terminal situation			○	153
FF.15	FM1 output voltage	0.00 ~ 10.00V		○	153
FF.16	FM2 output voltage	0.00 ~ 10.00V		○	153
FF.17	HDO rapid pulse output frequency	0.01 ~ 50.00kHz		○	153
FF.18	Output terminal situation			○	153
FF.19	Main and auxiliary frequency source	0: Main frequency source sets frequency 1: Auxiliary frequency source sets frequency		○	153

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
		2 :Combination frequency set			
FF.20	UP/DOWN frequency value	Unit：0.01Hz		○	154
FF.21	Multiple speed current segments	0 ~ 15		○	154
FF.22	PLC program operation current segments	0 ~ 15		○	154
FF.23	Potentiometer input voltage	0.00 ~ 5.00V		○	154
FF.24	Percentage of output current	100.0% corresponding frequency inverter rated current		○	154
FF.25	IGBT Heatsink temperature	Unit：0.1□		○	154
FF.26	Inverter module temperature	Unit：0.1□		○	154
FF.27	Total operating time	Unit: Hours		○	154
FF.28	Motor overload percentage	When reaching 100.0% report motor overload		○	154
FF.29	Frequency inverter overload percentage	When reaching 100.0% report frequency inverter overload		○	154
FF.30	Frequency inverter	Model confirm		○	154

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
	rated power				
FF.31	Frequency inverter rated voltage	Model confirm		○	154
FF.32	Frequency inverter rated current	Model confirm		○	154
FF.33	Frequency inverter type	0：G type 1：P type		○	155
FF.34	Output upper-limit frequency	Unit: 0.01Hz		○	155
FF.35	VR potentiometer input percentage	0.0 ~ 100.0%		○	155
FF.36	Analog V1 corresponding percentage	-100.0 ~ 100.0%		○	155
FF.37	Analog V2 corresponding percentage	-100.0 ~ 100.0%		○	155
FF.38	Rapid pulse input corresponding percentage	-100.0 ~ 100.0%		○	155
FF.39	Analog output FM1 corresponding percentage	0.0 ~ 100.0%		○	155
FF.40	Analog output FM2	0.0 ~ 100.0%		○	155

Function Code	Name	Setting Scope and Introduction	Factory Defaults	Modify	Page
	corresponding percentage				
FF.41	Rapid pulse output HDO corresponding percentage	0.0～100.0%		○	155
FF.42	Main frequency setting	Unit：0.01Hz		○	155
FF.43	Auxiliary frequency setting	Unit：0.01Hz		○	155
FF.44	U phase current per-unit value			○	156
FF.45	V phase current per-unit value			○	156
FF.46	W phase current per-unit value			○	156

Notice: 1) Factory default, do not change the parameter value.

Chapter 6 Functional Parameter Detail

6.1 F0 Basic Function Group

F0.00	**Selection of the main frequency source**	**Default：3**	**Setting scope：0～8**
F0.01	**Selection of the auxiliary frequency source**	**Default：0**	**Setting scope：0～8**

Select the frequency instruction input channel of the frequency inverter

0: Keyboard digital frequency setting

It could be set via F0.08 or ? and ? keys on the panel.

1: Analog V1 Setting

V1 is the 0~10V voltage input, it need to set the parameter F4.11~F4.15.

2: Analog V2 Setting

V2 is the 0~10V voltage input or 4~20mA current input, which could be selected through the jumper JP2, it need to set the parameter F4.16~F4.20.

Notes: when selecting the 4~20mA input through the jumper JP2, the corresponding voltage of the input current 20mA is 10V.

3: Keyboard Potentiometer Setting

4: Multi-segment speed running setting

Selecting the segment speed by the combination of multi-function input terminal, to ensure the running frequency by the F4 group multi-function input terminal segment speed selection and the target setting of F6.00~F6.15.

5: PID Control Setting

Select the process PID control output as running frequency. It is generally used in the spot industrial art close loop control, such as constant voltage close loop control, constant tension close loop control, it need to set the F7 group parameter.

6: Remote communication setting

The frequency instruction is set by the upper computer communication mode, through MODBUS communication protocol, it is supported by the expansion card SC-EXT1-IO of our

company, it need to set the F8 group parameter and refer to the communication protocol explanation of Chapter 7.

7: PLC program running setting

The frequency inverter runs by the simple PLC program, it needs to set the F6 group parameter.

8: HDI high-speed pulse setting

The frequency is set through the high-speed pulse input terminal, it is supported by the expansion card SC-EXT1-IO OF our company, it needs to set the F4.21~F4.24 parameter.

F0.02	**Auxiliary frequency source standard selection when overlay**	**Default：0**	**Setting scope：0～1**
F0.03	**Auxiliary frequency scope overlay**	**Default：100.0%**	**Setting scope :0.0～150.0%**

Auxiliary Frequency Source Standard Selection when overlay

0: Relative to maximum frequency

1: Relative to main frequency source

F0.04	**Main and auxiliary frequency combination mode**	**Default: 0**	**Setting scope： 0～6**

Main and Auxiliary Frequency Combination Mode Setting:

0: Only main frequency setting

1: Only auxiliary frequency setting

2: QUICK/JOG or terminal switching selection

3: Main frequency + auxiliary frequency (the direction is decided by the main frequency)

4: Main frequency - auxiliary frequency (the direction is decided by the main frequency)

5: The maximum of both (the direction is decided by the main frequency)

6: The minimum of both (the direction is decided by the main frequency)

F0.05	**Maximum output frequency**	**Default : 50.00Hz**	**Setting scope： F0.06(Min. 5.00Hz) ~ 600.00Hz**

Set the highest output frequency of the frequency inverter. It is the basis of frequency setting and the acceleration and deceleration speed.

F0.06	**Running frequency upper limit**	**Default: 50.00Hz**	**Setting scope：F0.07 ~ F0.05**

Upper limit value of frequency inverter output frequency. This value should be less than or equal to the maximum output frequency.

F0.07	**Running frequency lower limit**	**Default: 0.00Hz**	**Setting scope：0.00 ~ F0.06**

Frequency inverter output frequency lower limiting value.

Relation among the three ones: maximum output frequency>=upper limiting frequency>=lower limiting frequency.

F0.08	**Keyboard digital frequency setting**	**Default: 50.00Hz**	**Setting scope：0.00 ~ F0.06**

When the frequency source is 0(keyboard digital setting), the function code value is regarded as the initial value of frequency inverter digital preset frequency.

F0.09	**Running direction setting**	**Default: 0**	**Setting scope：0 ~ 2**

0: Forward running

When the frequency inverter is powered, it runs according to the actual direction.

1: Reverse running

Changing this function code can change the motor's rotation without any other parameter changed, the effect is same to modify any two lines of the motor's lines (U, V, W) to change the motor's rotation.

☞Note: after parameter initialization, the motor's rotation will return to the original state. Please caution in case the motor's rotation is forbidden changing after the system debugging.

2: Reverse forbidden

The inverter is reverse forbidden; it is suitable for the special reverse forbidden situation. After reverse forbidden, if there is reverse running control signal, the frequency inverter won't run.

F0.10	**Acceleration time 0**	**Default: Model determination**	**Setting scope：0.1～3600.0s**
F0.11	**Deceleration time 0**	**Default: Model determination**	**Setting scope：0.1～3600.0s**

Acc time is the time taken for the motor to accelerate from 0Hz to the maximum frequency (F0.05). Dec time is the time taken for the motor to decelerate from maximum frequency (F0.05) to 0Hz.

Actual Acc and Dec time=set Acc and Dec time*(set frequency/max frequency)

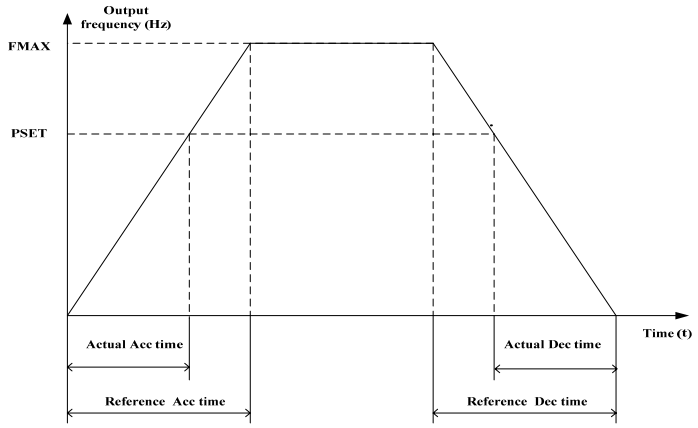


Fig.6-1 Illustration of Acc/Dec time

F0.12	**Running channel selection**	**Default: 0**	**Setting scope: 0～2**

Selection of the channel of frequency inverter control instruction.

The control command of frequency inverter includes: start, stop, forward, reverse, inching, fault reset.

0: Keyboard start-stop ("REMOT" light is off)

The start is controlled by RUN key, the stop command is controlled by STOP/RESET key, inching and forward and reverse command are selected and controlled by multi-function QUICK/JOG key. In the running state, if press RUN and STOP/RESET key at the same time, it would cause the frequency inverter to stop freely.

1: Terminal start-stop ("REMOT" light is flash)

Perform run command control through multi-function input terminals forward, reverse, forward inching, reverse inching and so on.

2: Communication start-stop ("REMOT" light is on)

The run command is controlled by the communication mode of upper computer, when selecting this item, the extension card SC-EXT-IO of our company must be selected.

F0.13	Terminal control running mode	Default: 0	Setting scope: 0 ~ 4

This parameter defines 5 different modes to control the running of frequency inverter through outer terminals.

0: Two-wire control 1

This mode is the general used two-wire control. It is used to control the forward and reverse run of the motor through forward function terminal and reverse function terminal. The setting of multi-function terminal is as follow:

Terminal	Setting	Description
Sx	01	Forward running
Sy	02	Reverse running

The control mode is as the following figure6-2.

K1	K2	Running command
0	0	Stop

0	1	Stop
1	0	Forward
1	1	Reverse

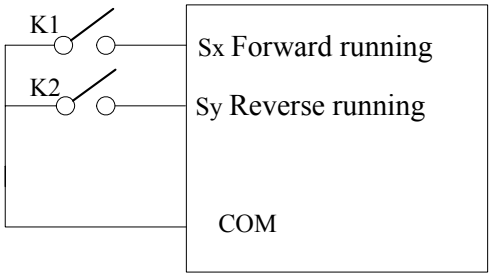


Figure 6-3 Illustration of Two-wire Running Mode 2

Notes: For two-wire running mode, when forward function terminal/reverse function terminal is valid and the frequency inverter stops due to the stop command caused by other source, even if the control terminal forward function terminal/reverse function terminal still Reserve valid, the frequency inverter won't run after the disappearance of stop command, if the user want the frequency inverter to run, it need to trigger the forward function terminal/reverse function terminal again.

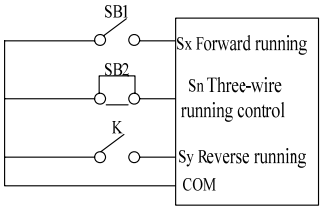
2: Three-wire control 1

This three-wire function terminal mode is enabled terminal, the running command is generated by forward function terminal, the direction command is generated by reverse function terminal, the three-wire function terminal is normal close.

Terminal	Setting	Description
Sx	01	Forward running
Sy	02	Reverse running
Sn	03	Three-wire running control

The control mode is as the figure 6-4.

K	Running direction



0	Forward
1	Reverse

Figure 6-4 Illustration of Three-wire Running Mode 1

Among: SB1: running button (normal open); SB2: stop button (normal close).

K: forward and reverse switch

3: Three-wire control 2

This three-wire function terminal mode is enabled terminal, the running command is generated by SB1 or SB3 and it control the running direction at the same time. The stop command is generated by the normal input SB2.

Terminal	Setting	Description
Sx	01	Forward running
Sy	02	Reverse running
Sn	03	Three-wire running control

The control mode is as the following figure6-5.

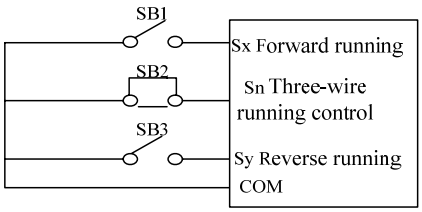


Figure6-5 Illustration of Three-wire running mode 2

Among: SB1: forward running button; SB2: Stop button; SB3: reverse running button.

4: Three-wire control 3

The same with three-wire control mode 2, the difference is the stop button is normal open

button.

F0.14	Control mode	Default: 1	Setting：0～2

Selection of the control mode of frequency inverter

0: No PG Speed vector control

No PG vector control mode refers to open-loop vector control, which is suitable for low frequency torque, the application where the speed control accuracy requirement is higher, one frequency inverter can only drive one motor. Such as machine tools, centrifuges, draw bench, injection molding machines and other loads.

1: V/F control

The V/F control is suitable for the applications which accuracy's requirement is not high, such as fan and pump loads.

2: No PG Torque control

The mode is applicable to applications which the accuracy's requirement of torque control is high, such as coiling, draw bench and other applications. After the drive's operation to restore the default value, the reference frequency which is set by panel and UP/DOWN function terminals will be auto-clear.

☞Note: When selecting the mode of vector's control, the motor's nameplate parameter must be set rightly and the motor parameter auto-learning must be finished before running to obtain the accurate motor parameter, Only obtain accurate motor parameter, the high performance of the vector control could be displayed. By adjusting the vector and torque control parameter (F3 Group), the vector control performance can obtain better performance.

F0.15	Model type selection	Default: 0	Setting：0～1

0: Applicable to constant torque load

1: Applicable to variable torque load (fan and water pump load)

F0.16	Motor rated voltage	Default: 380V	Setting scope：20～2000V

F0.17	Motor rated frequency	Default: 50.00Hz	Setting scope：5.00～F0.05

The motor rated voltage is the max output one. It is the corresponding output voltage when the frequency inverter output the basic running frequency.

The motor rated frequency is also known as the basic running frequency, it is the corresponding min frequency when the frequency inverter output max voltage.

F0.18	Expansion cards type	Default: 0	Setting scope：0～3

Setting the current installed expansion card type:

0: Without installing expansion card;

1: Installing the SC-EXT1-I0 model standard expansion card, see the description of Appendix1;

2: Installing the SC-EXT2-R model relay expansion card, see the description of Appendix2;

3: Installing the SC-EXT3-S model multi-function input terminal expansion card, see the description of Appendix3.

F0.19	UP/DOWN setting	Default: 0111H	Setting scope：0000H～0111H

Setting the frequency through ▲、▼ keys on the keyboard and UP/DOWN terminal function (frequency setting increase by degrees/frequency setting decrease by degrees), which is used to fine tuning the output frequency of the frequency inverter in the process of control system debugging.

Unit Digit:

0: Invalid

1: It is only valid for the keyboard digital frequency setting

Decade

0: No storage when powering down

The setting frequency won't be stored when the frequency inverter is powered down.

1: Storage when powering down

The setting frequency will be stored when the frequency inverter is powered down. When the power is on, it will combine with the current setting frequency automatically.

Hundred

0: Zero clearing when stop

The 、 keys on the keyboard and UP/DOWN terminal function are valid in the process of running, automatic zero clearing is set when stopping.

1: No zero clearing when stop

The 、 keys on the keyboard and UP/DOWN terminal function are valid when running and stopping.

Notes: When the user performs recover default value operation to the function parameter of the frequency inverter, the setting of keyboard and UP/DOWN terminal function will be zero clearing automatically.

F0.20	**UP/DOWN change rate**	**Default:1.00 Hz/s**	**Setting scope：0.01～100.00Hz/s**

The rate of change when adjusting and setting frequency of the keys ▲、▼ on the keyboard and UP/DOWN terminals.

F0.21	**Modulation function selection**	**Default: 0000H**	**Setting scope：0000H～1111H**

Unit Digit AVR

0: Invalid

1: Valid for whole course

2: Only invalid for deceleration

AVR function is output voltage automatic adjustment function. When AVR function is invalid, the output voltage will vary with the input voltage (or DC busbar voltage); when the AVR function is valid, the output voltage will not vary with the input voltage (or DC busbar voltage), the output voltage will Reserve constant within the output ability scope. When the deceleration time is too long to meet the on site requirement, the AVR function could be

cancelled to shorten the deceleration time.

Decade: Reservation

Hundreds: PWM Selection

0: PWM Mode 1

This mode is the normal PWM mode, the motor noise is low in low frequency and the motor noise is big in high frequency.

1: PWM mode 2

The noise in this running mode is low, but the wavelength is high, it needs to derate if selecting the frequency inverter of this function.

Kbit: automatic energy saving

0: Invalid

1: Valid

The automatic energy saving could be obtained by checking the load current and adjusting output voltage appropriately when the motor is in the process of no-load or light load. This function is especially valid for fan and pump load.

F0.22	**Carrier frequency**	**Default: Machine Type confirmation**	**Setting scope： 0.5～150.0kHz**

This function adjusts the carrier frequency of the frequency inverter. By adjusting carrier frequency, the motor noise could be lower, the point of resonance of the mechanical system could be avoided, which could decrease the disturbance of the circuit to the ground leakage current and the disturbance generated by the frequency inverter. When the carrier frequency is lower, the output current ultraharmonics component will increase, so the loss of machine and motor temperature rising. When the carrier frequency is higher, the loss of machine will lower, the motor temperature rising will lower, but the loss of frequency inverter will increase, the temperature rising and disturbance of frequency inverter will increase. The influence of carrier frequency to the equipment and environment is as the following table:

	Motor noise↓

Carrier Frequency↑	Motor temperature rising↓
	Output current smoothness↑
	Temperature rise of frequency inverter↑
	Leakage current↑
	External radiated interface↑

The relation between machine type and carrier frequency is as the following table:

Carrier Frequency / machine type	Max Carrier Frequency (kHz)	Min Frequency (kHz)	Default (kHz)
0.75 ~ 11kW	15.0	0.5	4.0
15 ~ 55kW	8.0	0.5	3.0
75 ~ 400kW	6.0	0.5	2.0

When the output frequency of frequency inverter is 0Hz, and it is in vector control or V/F control and torque lift, there is the voltage output in the frequency inverter, if running in 0Hz in a long term and there is voltage output, the motor heat dissipation is bad, it is easy to cause the motor heating. The user could set a certain output voltage holding time, after exceeding this holding time, the output voltage will turn to 0, which could prevent the motor from overheating.

F0.23	**Voltage of energy consumption brake value**	**Default：130.0%（380V series） 120.0%（220V series）**	**Setting Range:115.0 ~ 140.0%(Standard bus-wire voltage）**

This function code is the start voltage of setting energy consumption braking unit, if we set this value properly, which could brake the overload effectively.

F0.24	**Given frequency is less than frequency lower limit**	**Default：0**	**Setting Range：0～2**

0：Operating to lower limit frequency

When the given frequency is less than the lower limit one that setting through F0.07, the frequency inverter operate to lower limit frequency

1：Operating to zero frequency

When the given frequency is less than the lower limit one that setting though F0.07, the frequency inverter operate to zero frequency. But we should keep certain output voltage according to the work condition.

2：Stand by

When the given frequency is less than the lower limit one that setting through F0.07, there is no voltage outputting.

F0.25	**Holding Time of Zero Frequency Runtime Output Voltage**	**Default ： 3600.0s**	**Setting Range：0.0～6553.5s**

When the output frequency of frequency inverter is 0Hz and the vector or VF control has torque boost, the frequency inverter has certain voltage output with long working to zero frequency, if the motor cooling is bad, those will make the motor getting heater. In case the motor is overheated, the user could set a certain holding time of output voltage, if the time is exceeded, the output voltage would change to zero.

F0.26	**Software Version**	**Default：**	**Setting scope：**

It is used to show the software version number, this function code could only be checked, and couldn’t be modified.

F0.27	**Parameter Initialization**	**Default：0**	**Setting scope：0～2**

0: No operation

1: When the parameter recovers default, the frequency inverter would recover all parameter to default.

2: Eliminating recent failure logging.

6.2 F1 Start-Stop Control Group

F1.00	**Start function selection**	**Default: 0000H**	**Setting scope：0000H～1102H**

Unit digit: start mode selection

0: Direct-on starting

Start from the preset starting frequency (F1.01).

1: DC braking first, then start

DC braking first, then start from starting frequency. It is suitable for small inertia load which may reverse at the start.

2: Speed tracking, then start

Firstly, the frequency inverter calculates the motor's running speed and direction, and move to setting frequency from tracking speed to achieve smooth no-impact start to the rotating motor. The method is applicable the large inertia load to re-start after the drive stops instantly.

Notes: the machine type below 5.5kw is without speed tracking function.

Decade: Reserve

Hundred: Power on terminal running protection selection

When the running instruction channel is terminal control, in the process of power on of the frequency inverter, the system will detect the running terminal's state automatically, and conduct corresponding control according to the multi-function input terminal function.

0: terminal running command is invalid when power on

Even though the running command terminal is detected valid in the process of power on, the frequency inverter will not run, the system will in the running protection state, until disconnecting the running command terminal, then to close the terminal, the frequency inverter will run.

1: Terminal running command is valid when power on

If the running command terminal is detected valid in the process of power on, after the initialization, the system will start the running of frequency inverter automatically. This set could achieve the restart after power cut function under the control of terminal.

Notes: this function may cause serious consequence, the user should select cautiously.

Kbit: restart after power cut function under the keyboard control

0: Restart banned

It indicates that the frequency inverter won't start automatically when power on once again

after the frequency inverter power down.

1: Restart after power down is allowed

It indicates that the frequency inverter would be back to the running state before power cut automatically when the frequency inverter power on after the power cut. That is, if it is in running state before power cut, after the power is on again, the restart waiting time set by F1.10 will be delayed and it will start to run automatically, if it is in stop state before power cut, the frequency inverter won't start automatically after power on. This function is only valid to keyboard control.

Notes: the user should select allowed restart function cautiously, otherwise, serious consequence would be caused.

F1.01	**Directly start frequency**	**Defaul：0.00Hz**	**Setting scope：0.00～10.00Hz**
F1.02	**Start frequency holding time**	**Default：0.0s**	**Setting scope：0.0～50.0s**

Setting the appropriate starting frequency can increase the starting torque. Within start frequency holding time (F1.02), the frequency inverter output frequency is the start frequency, and then run from the start frequency to the target frequency, if the target frequency is less than start frequency (F1.01), the frequency inverter will not run and will be in the standby state. Starting frequency (F1.01) is not restricted by the lower limit frequency. In the process of forward and reverse switch, the start frequency (F1.01) will not function.

F1.03	**Start DC braking current**	**Default: 0.0%**	**Setting scope：0.0～150.0%**
F1.04	**Start DC braking time**	**Default: 0.0s**	**Setting scope：0.0～50.0s**

When the drive starts, first to DC braking with the preset start DC braking current, after the preset start DC braking time, the drive will begin to accelerated run. The DC braking is invalid if the setting DC braking time is 0.

DC braking current is greater, the braking force is greater. Starting the DC braking current is a percentage value relative to the drive's rated current.

F1.05	**Stop function selection**	**Default: 0010H**	**Setting scope：0000H～0021H**

Unit digit: stop mode selection

0: Dec to stop

After receiving the stopping command, the drive reduces its output frequency according to the Dec mode and the defined Dec time, and stops when the frequency decreases to 0.

1: Coast to stop

After receiving the stopping command, the drive stops outputting power immediately and the motor stops under the effects of mechanical inertia.

Decade: Stop DC Braking Enabled

0: Disabled, DC braking is not conducted when deceleration and stop;

1: The start frequency of DC braking is decided by F1.06

In the process of deceleration and stop, when the output frequency is less than the frequency set by F1.06, braking is conducted according to the parameter defined according to F1.07~F1.09.

2: The start frequency of DC braking is decided by external terminal

In the process of deceleration and stop, when one multi-function input terminal is set to 28 and the corresponding terminal input signal is valid, braking is conducted according to the parameter defined according to F1.07~F1.09 at the current frequency.

F1.06	**Stop braking start frequency**	**Default: 0.00Hz**	**Setting scope：0.00Hz～F0.05**
F1.07	**Stop braking waiting time**	**Default: 0.0s**	**Setting scope：0.0～50.0s**
F1.08	**Stop DC braking current**	**Default: 0.0%**	**Setting scope：0.0～150.0%**
F1.09	**Stop DC braking time**	**Default: 0.0s**	**Setting scope：0.0～50.0s**

Stop braking start frequency: in the process of deceleration and stop, when output frequency reaches this frequency, it begins to enter into stop braking waiting;

Stop braking waiting time: during the period of stop braking waiting, the frequency inverter

would block the output, DC braking will be conducted after the delay. It is used to prevent the over current fault caused by DC braking when the speed is higher.

Stop DC braking current: it refers to the added DC braking value. The bigger the value, the bigger the braking torque.

Stop DC braking time: the duration time of DC braking.

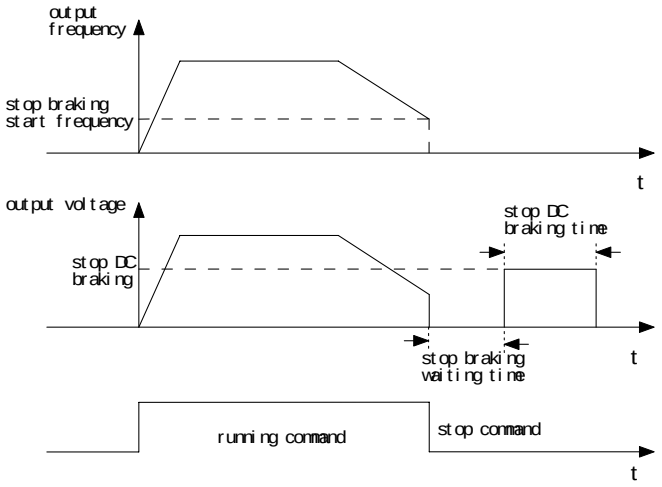


Figure 6-6 Illustration of stop DC braking

F1.10	**Power cut restart waiting time in keyboard control**	**Default: 1.0s**	**Setting scope：0.0 ~ 6553.5s**

If the frequency inverter is in running state before power cut, and restart after power cut is allowed, after the power is on again, the setting time will be delayed and it will start to run automatically.

F1.11	**The frequency drop point when trip-free**	**Default：80.0%**	**Setting scope: 70.0% ~ 110.0%standard busbar voltage**
F1.12	**Frequency decrease rate**	**Default:0.00Hz/s**	**Setting voltage : 0.00Hz/s ~**

	when trip-free		**50.00Hz/s**

When the frequency scale of decrease after power cut immediately is set to 0, frequency drop function after power cut immediately is invalid.

Frequency point drop after power cut immediately: after the power grid power down, busbar voltage is down to Frequency point drop after power cut immediately, the frequency inverter begin to low the running frequency according to frequency scale of decrease after power cut immediately to Reserve the motor in generating state and to maintain the busbar voltage by the feedback electric energy, which could guarantee the normal running of frequency inverter until the next power on.

Adjusting these two parameters properly could avoid the production halt caused by frequency inverter protection during power grid switch.

6.3 F2 VF Control Parameter Group

F2.00	**V/F curve setting**	**Default: 0**	**Setting scope：0～3**

This group function code is valid to V/F control (F0.14=1), and is invalid to vector control.

0: Linear V/F curve, it is applied to constant torque load, the output voltage is linear with output frequency.

1: 2.0 times power drop torque V/F curve, see the curve in figure 6-7;

2: Custom V/F percentage, it can realize manual energy saving control by adjusting F2.09;

3: Multipoint VF curve, it can set the needed V/F curve through function code F2.03~F2.08.

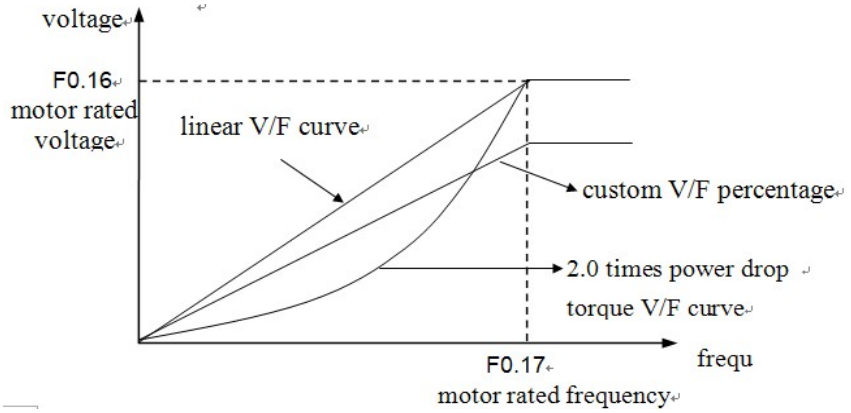


Figure 6-7 Illustration of V/F curve

F2.01	**Torque boost**	**Default: 0.0%**	**Setting scope :0.0% :automatic torque boost 0.1 ~ 30.0%**
F2.02	**Cut-off frequency of torque Boost**	**Default: 20.0%**	**Setting scope : 0.0 ~ 50.0%(motor rated frequency)**

Torque boost is mainly used in below the cut-off frequency (F2.02), after boost, the V/F curve after boost is shown in fig. 6-8, the torque boost can improve the V/F low frequency's torque characteristics.

Select the value of torque according the size of loads. The big loads can select a bigger boost, but the torque boost can not be set too big. If the torque boost is too large, motor will run with over excitation, the output current will increase, the motor will be easy to overheat, the drive's output current will be big, the efficiency will reduce.

When the torque boost is set to 0.0%, the inverter is auto torque boost.

Cut-off point of torque boost: the linear V/F curve is valid, under this frequency point, the torque boost is valid, over the point; the torque boost is invalid.

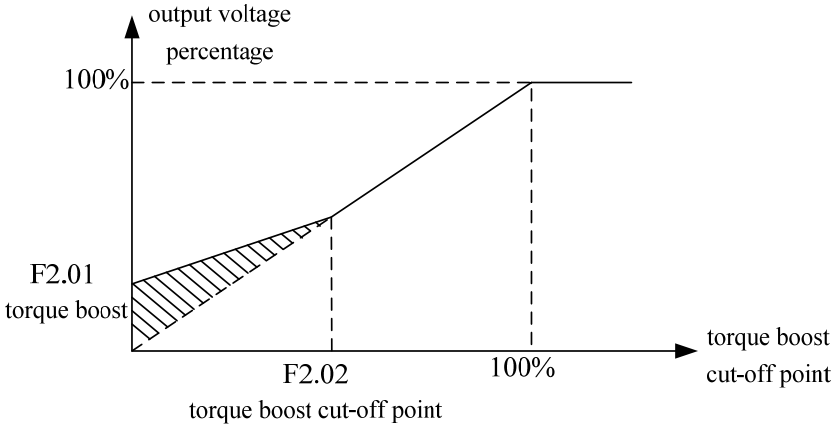


Figure 6-8 Illustration of torque boost

F2.03	**VF point 1 frequency F1**	**Default: 20.0%**	**Setting scope : 0.1 ~ F2.05**

F2.04	**VF point 1 voltage V1**	**Default: 20.0%**	**Setting scope：0.1 ~ F2.06**
F2.05	**VF point 2 frequency F2**	**Default: 50.0%**	**Setting scope：F2.03 ~ F2.07**
F2.06	**VF Point 2 Voltage V2**	**Default: 50.0%**	**Setting scope：F2.04 ~ F2.08**
F2.07	**VF point 3 frequency F3**	**Default: 70.0%**	**Setting scope：F2.05 ~ 100.0% (motor rated frequency)**
F2.08	**VF point 3 voltage V3**	**Default: 70.0%**	**Setting scope：F2.06 ~ 100.0% (motor rated voltage)**

The above six parameters F2.03 ~ F2.08 define multipoint V/F curve, as shown in figure 6-9.

The set value of V/F curve is usually set according to motor's load characteristics.

Notes: V1 < V2 < V3 ,F1 < F2 < F3. If the low frequency voltage is set too high, it would cause overheat of the motor and even burned and the frequency inverter maybe be over current and stall or over current protection.

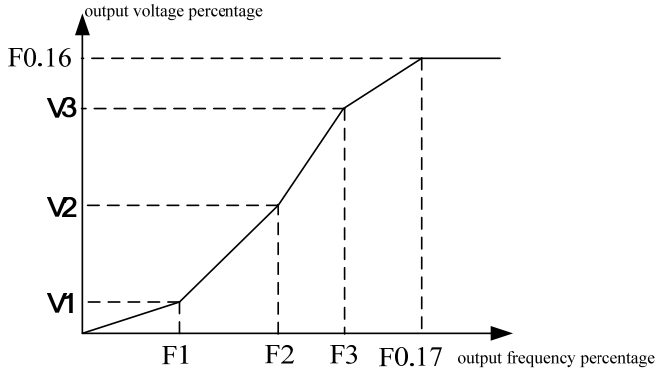


Figure 6-9 Illustration of V/F curve setting

F2.09	**Custom V/F percentage**	**Default: 100.0%**	**Setting scope：50.0～100.0%**

F2.10	**V/F slip compensation gain**	**Default: 0.0%**	**Setting scope：0.0～200.0%**

Setting this parameter could compensate the motor speed change caused by the load in V/F control, which can improve the hardness of motor mechanical characteristics, this value is corresponding to the motor's rated slip frequency.

F2.11	**Suppress oscillation enabled**	**Default: 1**	**Setting scope：0～1**

0: Suppress oscillation valid

1: Suppress oscillation invalid

The function code of suppression oscillation is for V/F control, the common motor with no-load or light-load often has current oscillation to lead the motor's abnormal operation, the serious can cause drive over current. When the F2.11 is selected to 0, the suppressing oscillation function is enabled, the drive will suppress the motor's occurring oscillation according to the parameters of functions F2.12～F2.15.

F2.12	**Suppress oscillation low-frequency threshold**	**Default：5**	**Setting scope：0～500**
F2.13	**Suppress oscillation low-frequency threshold**	**Default：100**	**Setting scope：0～500**

When most of motors run in some frequency band, the current oscillation will easily occur, light case is that the motor can not stable operate, the serious situation will lead the drive over-current.

When F2.11 is set to 0, suppress oscillation is valid. When F2.12 and F2.13 have small reference values, the effect of the suppress oscillation is evidence, the addition of the current is evidence; if the settings is large, the effect of suppress oscillation is weak.

F2.14	**Amplitude limit of suppress oscillation**	**Default: 5000**	**Setting scope：0～10000**

When suppress oscillation, the parameter can be used to limit the boost value of big voltage.

F2.15	**Boundary frequency between high and low frequency of suppress oscillation**	**Default：12.50Hz**	**Setting scope：0.00～F0.05**

F2.15 is the boundary of the function codes F2.12 and F2.13.

6.4 F3 Group Vector and Torque Control Parameter

F3.00	**Motor rated power**	**Default: Dependent on drive's model**	**Setting scope：0.4～900.0KW**
F3.01	**Motor rated current**	**Default: Dependent on drive's model**	**Setting scope：0.4～1000.0A**
F3.02	**Motor rated speed**	**Default: Dependent on drive's model**	**Setting scope：0～36000RPM**

☞Note: please set with reference to the values on the motor's nameplate. Excellent control performance of vector control should have accurate motor's parameters.

The drive has auto-learning function of motor's parameters. Only correctly setting the parameters of the motor's nameplate can ensure the accuracy of auto-learning. In order to ensure the control performance, please configure the motor according to standard adaptive motor of the frequency inverter. If the motor's power and that of standard adaptive motor have a wide gap, the control performance will significantly decrease.

☞Note: the motor parameter from F3.01 to F3.07 could be initialized by resetting motor rated power F3.00.

F3.03	**Resistance of stator**	**Default: Dependent on drive's model**	**Setting scope：0.001～65.535Ω**
F3.04	**Resistance of rotor**	**Default: Dependent on drive's model**	**Setting scope：0.001～65.535Ω**
	Leakage	**Default: Dependent on drive's**	**Setting scope：0.1～**

F3.05	**inductance of stator and rotor**	**model**	**6553.5mH**
F3.06	**Exciting inductance of stator and rotor**	**Default: Dependent on drive's model**	**Setting scope：0.1～6553.5mH**
F3.07	**Current without load**	**Default: Dependent on drive's model**	**Setting scope: 0.1～655.3.5A**

When the auto-learning of motor's parameters normally ends, the setting value from F3.03 to F3.07 will automatically update. These parameters are the benchmarks of high-performance vector control, and directly affect the control performance.

☞Note: Users do not arbitrarily change the group of parameters.

F3.08	**Parameter auto-learning**	**Default: 0**	**Setting scope：0～2**

0: No operation

The auto-learning is banned.

1: Dynamic auto-learning

Before starting auto-learning, please ensure the motor and load being disconnected, Reserve the motor no-load and confirm the motor in the standstill state.

Values on the motor's nameplate (F3.01～F3.02) must be input correctly before starting auto-learning, otherwise, the auto-learned parameters are not correct.

The size of Acc/Dec time (F0.10～F0.11) should be properly set according the size of the motor's inertia before starting auto-learning, otherwise, the over-current fault may be caused during auto-learning.

F3.08 is set to 1, then press ENTER key, the system begins auto-learning. Now, the LED flashing displays -TUN-, press RUN key, the LED displays TUN-0, after the motor running, TUN-1 is displayed and the light RUN flashes. When the auto-learning ends, the -END- will

be displayed, the LED will return the interface in standstill state. When the displayed -TUN- flashed, press MODE key can exit the auto-learning.

Press STOP/RESET key can stop the auto-learning during auto-learning.

2: Parameter stationary auto-learning

The motor and load don't need to disconnect in stationary auto-learning. Values on the motor's nameplate (F3.00 ~ F3.07) must be input correctly before starting auto-learning. After auto-learning, the stator's resistance, rotor's resistance and the leakage inductance can be detected, and exciting inductance and current without load can not be detected, which users can input the corresponding parameters according the experience.

☞Note: Only the panel can control the auto-learning starting and stopping; after auto-learning ending, the function code will be set to 0 automatically.

F3.09	**Proportional gain 1 of speed-loop**	**Default：20**	**Setting scope：0.0 ~ 100**
F3.10	**Integral gain 1 of speed-loop**	**Default：0.50s**	**Setting scope：0.0 ~ 10.00s**
F3.11	**The low frequency point to switch**	**Default：5.00Hz**	**Setting scope：0.00 ~ F3.14**
F3.12	**Proportional gain 2 of speed-loop**	**Default：25**	**Setting scope：0.0 ~ 100**
F3.13	**Integral gain 2 of speed-loop**	**Default：1.00s**	**Setting scope：0.0 ~ 10.00s**
F3.14	**The high frequency point to switch**	**Default：10.00Hz**	**Setting scope :F3.11 ~ F0.05**

The above parameter is valid only for vector control, and invalid for V/F control. Under the low frequency point to switch (F3.11), the parameters of speed-loop PI are F3.09 and F3.10. Above the high frequency point to switch (F3.14), the parameters of speed-loop PI are F3.12 and F3.13. Between the two switching points, the two groups of PI parameters will

obtain via linear change

By setting the speed regulator proportional coefficient and integral time, can adjust the dynamic response speed of vector control. Increasing the proportional gain and reducing the integration time, can accelerate the dynamic response of speed loop dynamic, but too large proportional gain or too small integration time easily lead to system oscillation, and excessive overshoot too small Proportional gain can easily cause the system to steady state oscillation, and speed static error.

PI speed loop parameters and the inertia of the motor system have close relationship. Users need to adjust it based on default PI parameters of different load characteristics to meet the requirements of various occasions.

F3.15	**Coefficient of VC slip compensation**	**Default: 100%**	**Setting scope：0～200%**

For no velocity sensor vector control, this parameter is used to adjust motor's speed control precision. Increase the parameter if the motor load speed is low, conversely, it is in converse.

F3.16	**The upper limit of reference torque**	**Default: 150.0%**	**Setting scope：0.0～200.0% rated current of frequency inverter**

The reference value 100% corresponds to the rated output current of drive.

F3.17	**Choice of torque setting mode**	**Default: 0**	**Setting scope：0～4**

Torque instruction input channel of frequency inverter is defined. When torque is set to minus, the motor will reverse.

0: Keypad digital frequency set

1: Analogue V1 setting

2: Analogue V2 setting

3: Analogue input V1+V2

4: Telecommunication setting

When the torque control is valid, the drive will output torque according to the reference torque, the output frequency is limited by the upper and down limit of frequency. When the reference torque of drive is bigger than load's torque, the output frequency of drive will rise until the upper frequency. When the reference torque is less than load's torque, the output frequency of drive will fall until down frequency. When the output frequency of the frequency inverter is limited, the output torque may be similar with the setting torque.

□Notes 1：When it is set to 1~4，100% is corresponding to 2 times rated current of the frequency inverter.

□Notes 2：It could be switched between torque control and speed control through multi-function input terminal.

□Notes 3：When there is stop command on torque control, it will switch to speed control automatically.

F3.18	**Keyboard digital torque setting**	**Default: 50.0%**	**Setting scope：-100.0～100.0%（100.0%corresponding to upper torque）**

When the torque command is set by keyboard (F3.17=0), the parameter should be set.

F3.19	**The source of setting upper limit frequency selection**	**Default: 0**	**Setting scope： 0～3**

There are many kinds of source which can be selected by F3.19 to set the upper limit of frequency. Especially, during torque control, the output frequency of drive can be changed by changing the upper limit of frequency.

0: Upper limit of frequency (F0.06) is set by keyboard

1: Upper limit of frequency (F0.06) is set by Analog V1

2: Upper limit of frequency (F0.06) is set by Analog V2

3: Upper limit of frequency (F0.06) is set by Remote communication

□Notes 1：When it is set to 0-3，100% correspond to the max frequency F0.05.

6.5 F4 Group Input Signal Group

F4.00	**S1 Terminal function selection**	**Default: 1**	**Setting scope: 0～30**
F4.01	**S2 Terminal function selection**	**Default: 2**	
F4.02	**S3 Terminal function selection**	**Default: 7**	
F4.03	**S4 Terminal function selection**	**Default: 0**	
F4.04	**S5 Terminal function selection**		
F4.05	**S6 Terminal function selection**		
F4.06	**S7 Terminal function selection**		
F4.07	**S8 Terminal function selection**		
F4.08	**S9 Terminal function selection**		
F4.09	**S10 Terminal function selection**		

0: No function

Even if there are input signals, the drive will not run. The unused terminals can be set no function in order to avoid malfunction.

1: Forward

2: Reverse

The external terminals control the drive operating direction.

3: 3-wire operation control

The terminal is used to set the drive's operating mode of 3-wire operation control, please refer to the description of 3-wire operation control function code F0.13.

4: Jog forward

5: Jog reverse

It is the frequency of Jog operating. The Acc/Dec time of Jog operation can be referred to the description of function codes FA.00 ~ FA.02.

6: Coast to stop (only valid when terminal control F0.01=1)

The stop process will not be controlled by drive. It is the common method of great load inertia and no requirement of stop time.

7: Fault reset

The function is same as the STOP/RESET key. The function can achieve Remote Fault Reset.

8: External fault input

When the drive receives the signal of external fault, the drive will alarm and stop.

9: Frequency setting increase (UP)

10: Frequency setting decrease (DOWN)

11: Frequency increase and decrease (UP/DOWN) setting clearing

When the reference frequency is set by external terminals, the function will be used to adjust the frequency increase instruction and decrease instruction. When the source of reference frequency is the digital setting, the function can be used to adjust the reference frequency for up/down, the terminal speed regulation is as shown in fig,6-10.

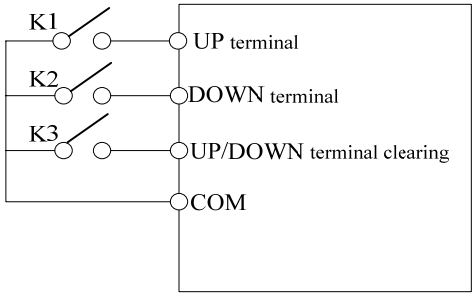


Figure 6-10 Illustration of terminal speed regulation

The terminals can be used to clear the reference frequency by UP/DOWN, and make the frequency return to the reference frequency by the channel of the reference frequency.

12:Multi-speed terminal 1

13:Multi-speed terminal 2

14:Multi-speed terminal 3

15:Multi-speed terminal 4

The combination of the 4 terminal's digital status can set 16 kinds of speed.

Note: the multi-speed 1 is the low bit, the multi-speed 4 is high bit, when the multi-speed is not 0, it has the highest priority.

16: Pause PID control

The PID control is temporary invalid, the drive will Reserve the current output frequency.

17: Pause traverse (hold the current frequency)

The drive pauses and Reserves the current frequency, when the function recovers, the drive will traverse operate with the current frequency.

18: Traverse reset (return the central frequency)

The drive will output the central frequency.

19: Acc/Dec suspension

Ensure the drive free from the external signals (except the stop signal), and Reserve the current output frequency.

20: Torque control banned (under torque control, switch to speed control forcibly)

The drive will forbid using torque control mode, and will switch to the speed control.

21: Temporarily clear the frequency UP or DOWN setting

If the terminal is closed, the reference frequency via the UP/DOWN will be clear, and the frequency will return to the reference frequency of the reference frequency channel. If the terminal is open, the frequency will return to the reference frequency of UP/DOWN setting.

22: Simple PLC program segment reset

The function terminal closes once time, the PLC operation will be reset and begin from the first stage.

23: Acc/Dec time selection

When the terminal with function is set to close, select Acc/Dec time 1 （FA.03、FA.04）as the current effective Acc/Dec time; otherwise, select Acc/Dec time 0（F0.10、F0.11）as the

current effective Acc/Dec time;

24: Selection of the auxiliary frequency source

When the terminal with function is set to close, the auxiliary frequency source selected by F0.03 is regarded as valid reference frequency.

Notes: this function is prior to the main and auxiliary frequency source switch set by QUICK/JOG.

25: Pause the simple PLC program operation

26: Reserve

27: Reserve

28: Stop DC braking control

29: Reserve

30: Reserve

F4.10	**Filter times of the switch**	**Default: 5**	**Setting scope： 0～10**

The parameter is used to set the filter time of S1~S10 terminals' sampling. In the case of large disturbance, the parameter should be increased to avoid malfunction

F4.11	**Lower limit of V1**	**Default：0.00v**	**Setting scope： 0.00～F4.13**
F4.12	**The reference percent corresponding to lower limit of V1**	**Default：0.0%**	**Setting scope：-100.0～100.0%**
F4.13	**Upper limit of V1**	**Default：10.00V**	**Setting scope：F4.11～10.00V**
F4.14	**The reference percent corresponding to upper limit of V1**	**Default：100.0%**	**Setting scope：-100.0～100.0%**
F4.15	**Filter time of input V1**	**Default：0.10s**	**Setting scope：0.00～10.00s**

The above function code defines the relationship between the analog input voltage's and

analog input's reference values. When the analog input voltage exceeds the reference max or min range, the exceeding part will be calculated as max or min value, see the following figure 6-11.

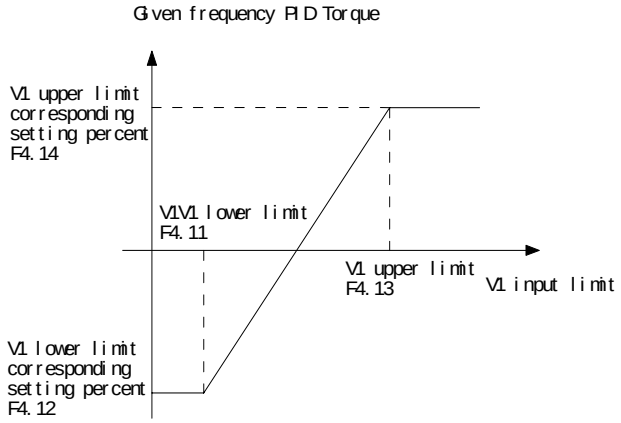

Given frequency FI D Torque
V1 upper limit corresponding setting percent F4.14
V1V1 lower limit F4.11
V1 upper limit F4.13
V1 input limit
V1 lower limit corresponding setting percent F4.12

Figure 6-11The relationship between analog preset and reference value

In different application, analog setting 100% corresponding nominal values have many difference, please refer to the instruction of each application.

V1 input filter time: adjust the analog input sensitivity, appropriately increase this value could enhance the immunity level of the analog, but it will lower the analog input sensitivity.

F4.16	**Lower limit of V2**	**Default: 2.00V**	**Setting scope： 0.0～F4.18**
F4.17	**The reference percent corresponding to lower limit of V2**	**Default: 0.0%**	**Setting scope: -100.0 ~ 100.0%**
F4.18	**Upper limit of V1**	**Default: 10.00V**	**Setting scope: F4.16 ~ 10.00V**
F4.19	**The reference percent corresponding to upper limit of V2**	**Default: 100.0%**	**Setting scope: -100.0 ~ 100.0%**

F4.20	**Filter time of input V2**	**Default: 0.10s**	**Setting scope： 0.0～10.00s**

The setting method of V2 is similar to V1.

Notes: The analog V2 could support 0~10V or 4~20mA input. When V2 select 4~20mA input through JP2 jumper, when setting F4.16 and F4.18, it need to convert to voltage according to actual input current. The conversion method: 20mA corresponds to the voltage 10V.

F4.21	**HDI high speed impulse frequency lower limit**	**Default: 0.00kHz**	**Setting scope： 0.00～F4.23**
F4.22	**The reference percent corresponding to lower limit frequency of HDI**	**Default: 0.0%**	**Setting scope: -100.0～100.0%**
F4.23	**HDI high speed impulse frequency upper limit**	**Default: 50.00kHz**	**Setting scope: F4.21～50.00kHz**
F4.24	**The reference percent corresponding to upper limit frequency of HDI**	**Default: 100.0%**	**Setting scope： -100～100.0%**

This group the function code of this group defines the corresponding relation when using impulse as input mode. The setting of this group is similar to V1.

6.6 F5 Group Output Signal Group

F5.00	**SP1 output selection**	**Default: 1**	**Setting scope： 0～30**
F5.01	**SP2 output selection**	**Default: 2**	
F5.02	**Relay 1 output selection**	**Default: 3**	
F5.03	**Relay 2 output selection**	**Default: 0**	
F5.04	**Relay 3 output selection**	**Default: 0**	

F5.05	**Relay 4 output selection**	**Default: 0**	
F5.06	**Relay 5 output selection**	**Default: 0**	

0：No output

1：Frequency inverter in service

When the frequency inverter runs, ON signal is output.

2：Frequency inverter is ready

When frequency inverter is in halt mode and without fault, ON signal is output.

3：Frequency inverter is in fault

When fault happens to frequency inverter, ON signal is output.

4：Frequency level detects FDT output.

5：Set frequency arrival

6：Zero speed in service

When the output frequency is 0, ON signal is output.

7：Upper limit frequency arrival

When running frequency arrives upper limit frequency, ON signal is output.

8：Lower limit frequency arrival

When running frequency arrives lower limit frequency, ON signal is output.

09: Output is finished during PLC program running stage

A 500ms width pulse signal is output when PLC program run finishes a stage.

10：Output is finished during PLC program circulating

A 500ms width pulse signal is output when PLC program run finishes a circulation this function is invalid if it is set to continuous cycle.

11：DC braking in process

12：Torque level detects FDT output

13：Retain

14：Retain

15：Run in reverse

16：Retain

17：Circulating 1 set driving 2 No. 1 pump frequency conversion input

18：Circulating 1 set driving 2 No. 1 pump power frequency input

19：Circulating 1 set driving 2 No. 2 pump frequency conversion input

20：Circulating 1 set driving 2 No. 2 pump power frequency input

21：Input terminal S1 state

22：Input terminal S2 state

23：Input terminal S3 state

24：Input terminal S4 state

25：Input terminal S5 state

26：Input terminal S6 state

27：Frequency inverter alarm state

28：Frequency inverter dormancy state

29：Retain

30：Retain

F5.07	**SP1 close delay time**	**Default: 0.0s**	**Setting scope: 0.0 ~ 6553.5s**
F5.08	**SP1 break delay time**	**Default: 0.0s**	**Setting scope: 0.0 ~ 6553.5s**
F5.09	**SP2 close delay time**	**Default: 0.0s**	**Setting scope: 0.0 ~ 6553.5s**
F5.10	**SP2 break delay time**	**Default: 0.0s**	**Setting scope: 0.0 ~ 6553.5s**
F5.11	**Relay1 TABC output close delay time**	**Default: 0.0s**	**Setting scope: 0.0 ~ 6553.5s**

F5.12	**Relay1 TABC output break delay time**	**Default: 0.0s**	**Setting scope: 0.0 ~ 6553.5s**

Set SP1, SP2 and relay 1, the delay time from the change of state to the change of actual output.

F5.13	**Frequency arrival (FAR) detection width**	**Default: 0.0%**	**Setting scope： 0.0～100.0% (max output frequency)**

The output frequency of frequency inverter output pulse signal in the positive and negative detection width of setting frequency, the detail is as the following figure 6-12.

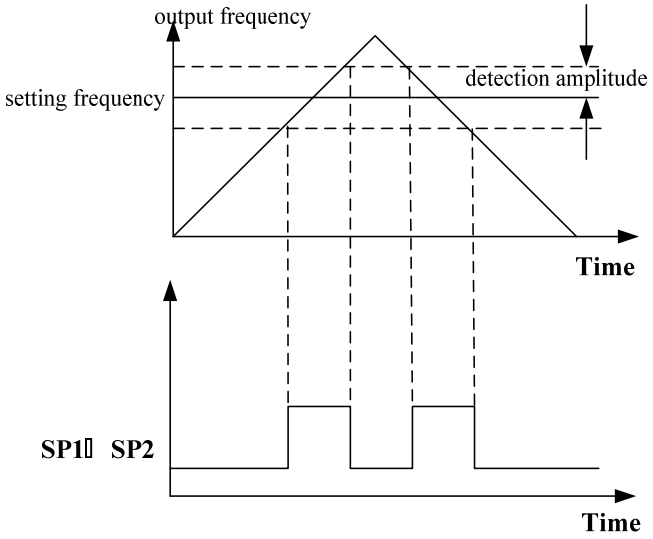


Figure 6-12 Illustration of the frequency arriving at the detection amplitude

F5.14	**FDT electrical detection value**	**Default: 50.00Hz**	**Setting scope：00.00～F0.05**
F5.15	**FDT lag detection value**	**Default: 5.0%**	**Setting scope：000.0～100.0% (FDT electrical level)**

ON signal is output when output frequency exceeds a setting frequency FDT electrical level until the output frequency is lower than F5.14*（1000- F5.15), the detail wave form is as the

following figure 6-13:

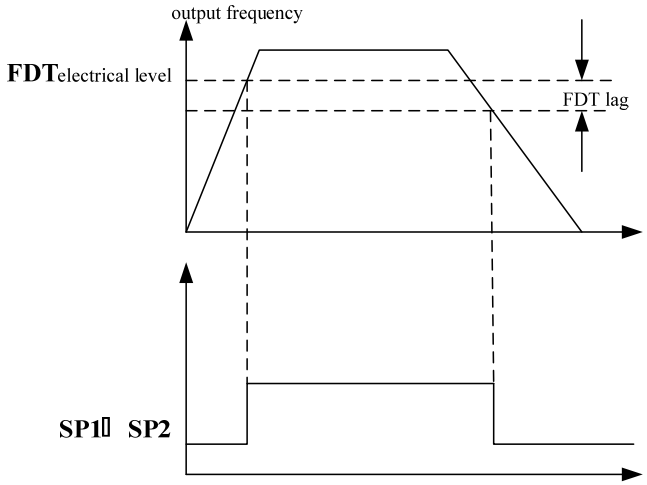


Figure 6-13 Illustration of FDT electrical level

F5.16	**FDT Torque level detection value**	**Default: 100.0%**	**Setting scope： 0.0 ~ 250.0%**
F5.17	**FDT Torque level detection lagged value**	**Default: 5.0%**	**Setting scope: 0.0 ~ 100.0%**

When output current percent is equal or greater than F5.16, the corresponding multi-function input terminal is close, when output current percent is less than or equal to F5.16*(1000- F5.17) again, then the terminal breaks. It is similar with FDT electrical level function.

Terminal output will break unconditionally in stop or fault state.

F5.18	**FM1 output selection**	**Default: 0**	**Setting scope：0～15**
F5.19	**FM2 output selection**	**Default: 3**	**Setting scope：0～15**
F5.20	**HDO high speed pulse output selection**	**Default: 1**	**Setting scope：0～15**

The standard output of FM1 and FM2 analog output is 0～10V or 0～20mA, current or

voltage output could be selected through JP 9 and JP10 jumpers. The output range of HDO of open collector high speed pulse is 0.0 ~ 50.0kHz.

Notes: The output of HDO of open collector high speed pulse is only valid in VF control mode (F0.014=1).

The representative corresponding variable range is as follows:

Set value	Function	Range
0	Running frequency	0 ~ max output frequency
1	Setting frequency	0 ~ max output frequency
2	Busbar voltage	0 ~ 2 times standard busbar
3	Output current	0 ~ 2 times frequency inverter rated current
4	Output voltage	0 ~ 1.5 times frequency inverter rated voltage
5	Running speed	0 ~ 3 times motor rated speed
6	Output power	0 ~ 2 times motor rated power
7	Setting torque	0 ~ 2 times frequency inverter rated current
8	Output torque	0 ~ 2 times frequency inverter rated current
9	PID setting	0.0 ~ 100.0%
10	PID feedback	0.0 ~ 100.0%
11	Analog V1 input value	0.0 ~ 10.0V
12	Analog V2 input value	0.0 ~ 10.0V/ 0 ~ 20mA
13	HDI high speed pulse input frequency	0.0 ~ 50.00kHz
14	Retain	
15	Retain	

F5.21	**FM1 output lower limit percent**	**Default: 0.0%**	**Setting scope: 0.0 ~ 100.0%**
F5.22	**Corresponding output of FM1 lower limit**	**Default: 0.00V**	**Setting scope: 0.0 ~ 10.00V**
F5.23	**FM1 output upper limit percent**	**Default: 100.0%**	**Setting scope: 0.0 ~ 100.0%**
F5.24	**Corresponding output of FM1 upper limit**	**Default: 10.00V**	**Setting scope: 0.0 ~ 10.00V**

The above function codes define relationship between output value and the output value of analog output, if the output exceeds the reference range of the max/min frequency, the exceeding part will be calculated as upper limit output or lower limit output, as shown in figure6-14.

When the analog output is current, 20mA is equivalent to 10V.

In different application, the 100% of output value corresponds different analog output, refer to description of application part.

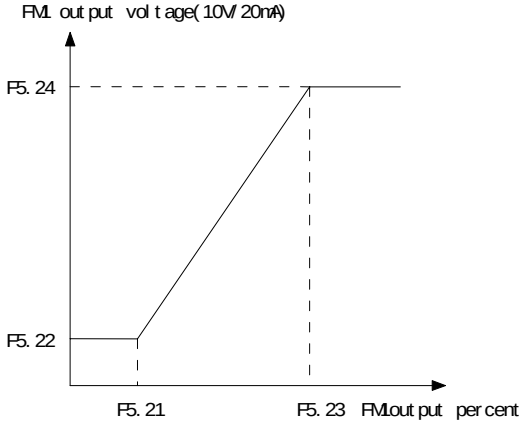


Figure 6-14 Corresponding relation between FM1 output voltage and output percent

F5.25	**FM2 output lower limit percent**	**Default：0.0%**	**Setting scope：0.0～100.0%**
F5.26	**FM2 lower limit corresponding output**	**Default：0.00V**	**Setting scope：0.0～10.00V**
F5.27	**FM2 output upper limit percent**	**Default：100.0%**	**Setting range：0.0～100.0%**
F5.28	**FM2 upper limit corresponding output**	**Default：10.00V**	**Setting range：0.0～10.00V**
F5.29	**HDO high speed pulse output lower limit percent**	**Default：0.0%**	**Setting range：0.0～100.0%**
F5.30	**HDO lower limit corresponding output**	**Default：0.00kHz**	**Setting range: 0.0～50.00kHz**
F5.31	**HDO high speed pulse output upper limit percent**	**Default：100.0%**	**Setting range：0.0～100.0%**
F5.32	**HDO upper limit corresponding output**	**Default：50.00kHz**	**Setting range: 0.0～50.00kHz**

The corresponding relation of output is similar with FM1.

6.7 F6 Group Multi-speed and PLC Program Run

Simple PLC function is a multi-segment speed generator, it can enable the drive change its operating frequency and directions automatically according to the operating time to satisfy the manufacturing requirements. This frequency inverter series could achieve 16 section speed control. After the setting PLC finish a circulating (or a stage), a pulse signal would be output by the multi-function digital output terminal or multi-function relay, the duration is 500ms, it is as the following figure 6-15.

F6.00	**PLC phase 0/multistage speed 0 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**
F6.01	**PLC phase 1/multistage speed 1 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**
F6.02	**PLC phase 2/multistage speed 2 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**
F6.03	**PLC phase 3/multistage speed 3 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**
F6.04	**PLC phase 4/multistage speed 4 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**
F6.05	**PLC phase 5/multistage speed 5 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**
F6.06	**PLC phase 6/multistage speed 6 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**
F6.07	**PLC phase 7/multistage speed 7 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**
F6.08	**PLC phase 8/multistage speed 8 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**
F6.09	**PLC phase 9/multistage speed 9 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**
F6.10	**PLC phase 10/multistage speed 10 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**
F6.11	**PLC phase 11/multistage speed 11 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**
F6.12	**PLC phase 12/multistage speed 12 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**
F6.13	**PLC phase 13/multistage speed 13 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**

F6.14	**PLC phase 14/multistage speed 14 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**
F6.15	**PLC phase 15/multistage speed 15 target**	**Default: 0.0%**	**Setting scope：-100.0～100.0%**
F6.16	**PLC phase 0 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**
F6.17	**PLC phase 1 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**
F6.18	**PLC phase 2 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**
F6.19	**PLC phase 3 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**
F6.20	**PLC phase 4 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**
F6.21	**PLC phase 5 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**
F6.22	**PLC phase 6 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**
F6.23	**PLC phase 7 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**
F6.24	**PLC phase 8 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**
F6.25	**PLC phase 9 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**
F6.26	**PLC phase 10 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**
F6.27	**PLC phase 11 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**
F6.28	**PLC phase 12 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**
F6.29	**PLC phase 13 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**
F6.30	**PLC phase 14 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**
F6.31	**PLC phase 15 runtime**	**Default: 0.0s**	**Setting scope：0.0～6500.0s**

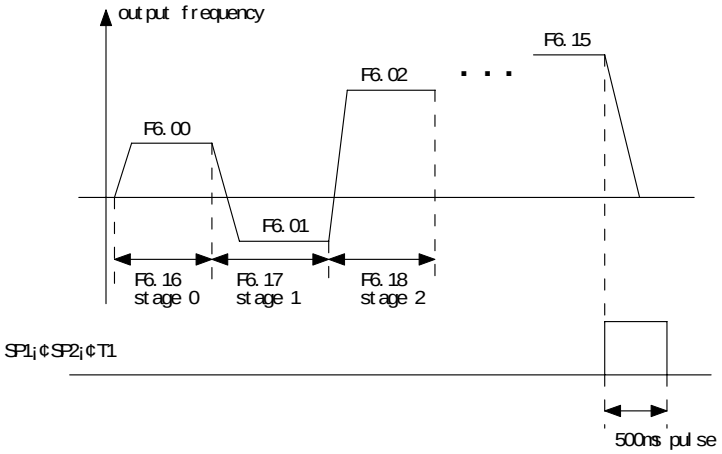


Figure 6-15 Illustration of Simple PLC Run

The corresponding max frequency is F0.05 if the frequency is set to 100.0%, the minus indicates run in reverse.

The relation between the state that multi-function input terminal select multi-speed terminal 4,3,2,1 and segments number of multi-speed and selected goal setting is as the following table. 0 represent the terminal disconnect of the corresponding function, 1 represent the terminal close of the corresponding function.

Terminal 4	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Terminal 3	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
Terminal 2	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
Terminal 1	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
Segments number	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Goal setting	F6.00	F6.01	F6.02	F6.03	F6.04	F6.05	F6.06	F6.07	F6.08	F6.09	F6.10	F6.11	F6.12	F6.13	F6.14	F6.15

F6.32	**PLC function selection**	**Default: 0000H**	**Setting scope：0000H～1122H**

Single digit：cycle mode selection

0：Stop after operating for 1 cycle（timing stop function could be achieved. the drive stops automatically after one cycle of operation and will start when receiving RUN command again.

1: Holding at the final value after single cycle of operation

The drive will maintain the operating frequency and direction of last stage after completing one cycle of operation.

2: Cycle continuously (valid after stop)

The drive will start next cycle of operation automatically after completing one cycle of operation until receiving STOP command, the system will stop.

Decade：PLC breaking point recovering mode selection

0: Operate from first section

1: Continue from the stage frequency where the drive stops

2: Continue to operate at the run frequency when the drive stops

Hundreds：PLC mode saving at power down

0：Not saving

1：Saving

PLC saving at power cut refers to PLC run stage and run frequency before storage power down. PLC stop storage refers to the storage of PLC run stage and run frequency after giving the stop command.

Kbit：Stage time limit

0：S

1: Min

F6.33	PLC goal setting unit selection	Default：	Setting scope：0～1

0：Percent setting

1：Frequency setting

6.8 F7 Group Process PID Parameter

PID control is common method of process control, by proportion, integral, differential operation to the residual quantity of feedback signal and objective signal of the controlled volume, the close loop system is formed by adjusting the output frequency of the frequency inverter to stabilize the controlled volume in objective value. It is suitable to the process control situation like flow control, pressure control, temperature control and so on, the process PID control functional block diagram is shown as the figure6-16.

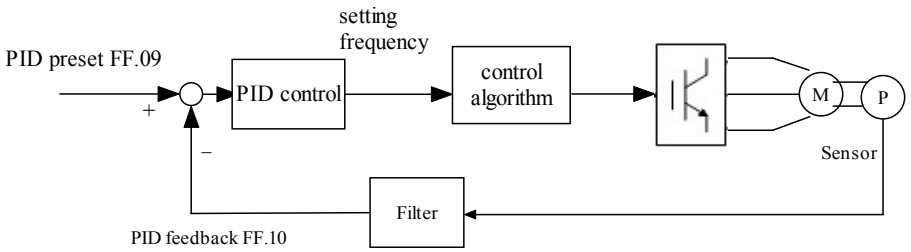


Figure 6-16 Process PID control functional block diagram

F7.00	**PID control function selection**	**Default: 0000H**	**Setting scope：0000H ~ 0146H**

Single digit：PID Reference channel selection

0：Keyboard digital frequency setting

1：Analog V1 setting

2：Analog V2 setting

3：Keyboard potentiometer setting

4：Multistage speed run setting

5：Telecommunication setting

6：HDI high speed pulse setting

This parameter is used to select process PID goal value reference channel. The setting goal value of process PID is the relative value, the setting range is 0.0%~100.0%. The feedback of PID is also the relative value, the function of PID is to make the feedback the same as the

reference.

Decade：PID feedback channel selection

0：Analog V1 feedback

1：Analog V2 feedback

2：Keyboard potentiometer setting

3：Telecommunication feedback

4：HDI high speed pulse feedback

This parameter is used to select feedback signal channel of PID, The feedback of process PID is the relative value, the setting range is 0.0%~100.0%.

Hundred：PID output characteristic selection

0: PID output is positive characteristic, when the feedback signal is larger than reference value of PID, the output frequency of the frequency inverter has to be lowered to make the PID balance, such as tension PID control, water supply, air supply PID control.

1: PID output is negative characteristic, when the feedback signal is bigger than reference PID value, the drive should output the upper limit of frequency to hold the PID balance, such as tension PID control of rewinding.

F7.01	**Feedback signal protection function selection**	**Default: 0000H**	**Setting scope：0000H ~ 0022H**

Single digit：Feedback broken line detection selection

0：Invalid

1：Alarm run

FAULT indicator light flash, the running frequency is fixed at the frequency set by F7.08.

2：Fault stop

Fault(E022)。

Decade：Feedback overpressure protection selection

0：Invalid

1：Alarm and run in fixed frequency.

FAULT indicator light flash, the running frequency is fixed at the frequency set by F7.14.

2：Fault stop

Fault E024。

F7.02	**Keyboard digital PID reference**	**Default: 0.0%**	**Setting scope：0.0%～100.0%**

This parameter need to be set in keyboard preset of PID goal source.

F7.03	**Proportional gain (KP)**	**Default: 5.00**	**Setting scope：0.00～50.00**
F7.04	**Integral time (Ti)**	**Default: 0.40s**	**Setting scope：0.01～50.00s**

Proportional gain (Kp): determines intensity of PID conditioner. The bigger the proportional gain of KP, the bigger intensity.

Integral time (Ti): determines the integral speed of the PID conditioner for error between the PID reference and feedback value.

F7.05	**The limit of PID control slip**	**Default: 0.0%**	**Setting scope：0.0～100.0%**

This parameter defines the max deviation relative to close-loop set point, PID regulator stops operation when the feedback value is within this range. Setting this parameter correctly is helpful to improve the system output accuracy and stability. This function is mainly used in the system where the requirement on control accuracy is low and there is no frequent adjustment, such as the constant voltage water supply system.

F7.06	**The value of feedback disconnection detected**	**Default: 0.0%**	**Setting scope：0.0～100.0%**
F7.07	**Feedback disconnection detected time**	**Default: 10.0s**	**Setting scope：0.0～3600.0s**
F7.08	**Feedback disconnection alarm**	**Default: 25.00Hz**	**Setting scope：0.00～**

	run frequency set		**F0.05**

The system will always detect the PID feedback value, when the feedback value is less than the feedback disconnection detected value, the system will begin to time for detection. When the duration is over the feedback disconnection detected time, the system will select run continuously or report fault according to feedback disconnection motion.

F7.09	**Sleep frequency**	**Default: 0.00Hz**	**Setting scope：F0.08～F0.05**

When the sleep frequency is set to 0, the sleep function couldn't be started. When dormancy frequency is set to 0 or not using PID, the lower limit frequency could be bigger than sleep frequency, otherwise, the lower limit frequency need to be less than sleep frequency; it runs according to the mode set by F0.24 when PID frequency is less than lower limit frequency.

F7.10	**Sleep delay**	**Default: 120.0s**	**Setting scope：0.0～3600.0s**

If the output frequency of PI adjusted value is less than sleep frequency (F7.09), the duration is larger the sleep delay time of the frequency, the drive will stop and into the sleep state.

F7.11	**Wakeup value**	**Default: 10.0%**	**Setting scope：0.0～100.0%**

This parameter is used to ensure the PID feedback value which is used in the wakeup start of the frequency inverter.

F7.12	**Wakeup delay**	**Default: 30.0s**	**Setting scope：0.0～3600.0s**

When PID feedback value is less than this wakeup value and the duration time exceeds the wakeup delay time, the frequency inverter exit sleep state and begin to output frequency.

F7.13	**PID feedback oversize detection value**	**Default: 100.0%**	**Setting scope: 20.0～100.0%**
F7.14	**PID feedback oversize detection time**	**Default: 3.0s**	**Setting scope：0.0～3600.0s**
F7.15	**PID feedback oversize alarm run fixed frequency set**	**Default: 0.00Hz**	**Setting scope：0.00～F0.05**

The system always detect the PID feedback value, when feedback value is bigger than feedback disconnection detection value, the system begin to detect and time, when duration exceeds feedback oversize detection time, the system would select to run continuously or fault according to feedback oversize motion.

6.9 F8 Group Communication Parameter

F8.00	**Local communication address**	**Default: 1**	**Setting scope：0:** is the broadcasting address **1～247**

The Local address is unique in the communication network, which is the basis to achieve point to point communication between PC and drive.

When the slave communication address is set to "0", it is the broadcast communication address, all drives on the MODBUS can receive the frame, but will not answer the PC.

F8.01	**Communication configuration**	**Default: 0003H**	**Setting scope：0000H～0055H**

Single digit：Baud rate set

0：1200BPS

1：2400BPS

2：4800BPS

3：9600BPS

4：19200BPS

5：38400BPS

This parameter is used to set the data transmission speed between host PC and drive.

☞Note: the host PC's and drive's baud rate must be same, otherwise, the communication can not be done. The bigger baud rate, the faster communicating speed will be.

Decade：Data bit parity setting

0：No parity (N，8，1)for RTU

1：Even parity (E，8，1)for RTU

2：Odd parity (0，8，1)for RTU

3：No parity (N，8，2)for RTU

4：Even parity (E，8，2)for RTU

5：Odd parity (Q，8，2)for RTU

The host PC and drive must have the same data format; otherwise, the data can not be communicated.

F8.02	**Delay for responding**	**Default: 5ms**	**Setting scope：0～200ms**

It refers to the waiting time from drive receiving the host PC command to returning response frame to it.

F8.03	**The fault time of Communication overtime**	**Default: 0.0s**	**Setting scope：0.0s invalid 0.1～100.0s**

When this function code is set to 0.0S, communication overtime fault judgment is not conducted. When the time is set to non 0, if the spacing interval between this communication and next communication exceeds the communication overtime time, the system will report communication fault error (E018).

F8.04	**Communication response handling**	**Default：0001H**	**Setting scope：0000H～0013H**

Single digit：Transmission error handling

0：Alarm and coast to stop

1：No alarm and continue running

2：No alarm and stop in stopping mode (only in communication control mode)

3：No alarm and stop in stopping mode (in all control modes)

The drive can select to shield failure alarm and shutdown and Reserve operating in the abnormal communication.

Decade：Transmission response handling

0：Respond for writing

1：No respond for writing

The drive only responds the reading command of PC, and doesn't responds the writing command, which can improve the communication efficiency

6.10 F9 Group Human-computer Interface

F9.00	Key function setting	Default: 0000H	Setting scope：0000H～0034H

Single digit：Function selection of QUICK/JOG key

QUICK/JOG key is multi-function key. The function of QUICK/JOG can be determined by relative parameters.

0: Jog operation

QUICK/JOG key achieves jog operation.

1: Switch between forward and reverse

Use QUICK/JOG key to switch the operating frequency direction. It is valid only in the QUICK/JOG keyboard channel control mode.

2: Clear the set UP/DOWN key is used to clear the preset value of UP/DOWN.

3：Main and auxiliary frequency source switch

Main and auxiliary frequency source switch could be achieved through QUICK/JOG key, when auxiliary frequency source is selected valid through multi-function input terminal, this key would be without response.

4：Torque control banned/valid switch

Torque control and speed control under torque control could be switched through QUICK/JOG key.

Decade：STOP/RESET key stop function selection

The function code defines the valid selection of STOP/RESET stop function. It is always valid for fault reset in any case.

0: valid for panel control

1: Valid for panel and terminal control in the same time

2: Valid for panel and communication control in the same time

3: Valid for the entire control mode

F9.01	Normal monitoring parameter selection when stop	Default：1	Setting scope：0～30

This parameter is used to ensure the display content of the operation panel under normal monitoring mode. Under normal monitoring mode, the following six parameters are displayed through >>/SHIFT key: running frequency, setting frequency, busbar voltage, output current, output voltage, running speed. If there is without any pressing within one minute, it will be back to the normal monitoring mode, the keyboard will display the parameter variable selected by F9.01. The corresponding monitoring parameter and the corresponding range could refer to FF group parameter FF.00～FF.30.

F9.02	Normal monitoring parameter selection when running	Default：0	Setting：0～30

If there is other variable-speed gear like reducer casing in the driving system, this parameter could be changed to make the showing speed in conformity with the actual system.

F9.03	User password	Default：0	Setting scope：0～65535

The password protection function will be valid when setting to any nonzero number, please do remember the setting user password. When set to 00000, clear the user password set before and make the password protection function invalid.

When the user password is set and valid, if the user password is wrong, the user couldn't enter into parameter menu, only to input the right user password could the user check and modify the parameter.

Exit function code editing state, the password protection will come into effect within 1 minutes, when enter into function code editing state by pressing MODE key after the password come into effect, 0.0.0.0.0. will be displayed, the user should input user password rightly, otherwise, the user couldn't enter.

Notes: please modify the user password carefully, otherwise, problem would occur to the system.

F9.04	Reserve	Default：	Setting scope：

F9.05	**Accumulative conduction time hours**	**Default：This parameter is read-only.**	**Setting scope：H**
F9.06	**Accumulative conduction time minutes**	**Default：This parameter is read-only.**	**Setting scope：Min**

6.11 FA Group Enhancement Function Group

FA.00	**Jog running frequency**	**Default：10.00Hz**	**Setting scope: 0.00 ~ F0.05**
FA.01	**Acc time of Jog operation**	**Default：determine according to type**	**Setting scope: 0.1 ~ 3600.0s**
FA.02	**Dec time of Jog operation**	**Default：determine according to type**	**Setting scope: 0.1 ~ 3600.0s**

Acc time of Jog operation: the drive needs the time from 0Hz accelerating to Maximum output frequency.

Dec time of Jog operation: the drive needs the time from Maximum output frequency decelerating to 0Hz.

FA.03	**Acc time 1**	**Default: Determine according to type**	**Setting scope: 0.1 ~ 3600.0s**
FA.04	**Dec time 1**	**Default: Determine according to type**	**Setting scope: 0.1 ~ 3600.0s**

The Acc/Dec time 0 during the running process of frequency inverter could be selected by the multi-function digital input terminals. If selecting the multi-function terminal of Acc/Dec time close, then select Acc/Dec time of this group to 1.

In the forward and reverse transient process of the frequency inverter, set the transient

time where zero frequency is output. As shown in figure 6-17:

F A.05	**Run reverse/forward dead time**	**Default: 0.0s**	**Setting scope: 0.0 ~ 3600.0s**

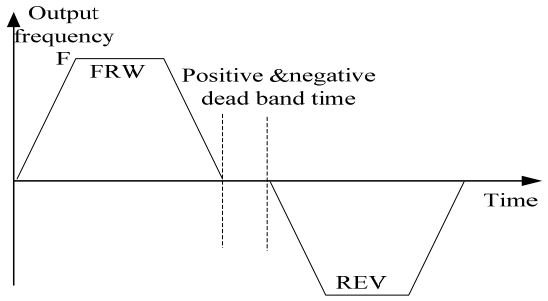


Figure 6-17 Illustration of run reverse/forward dead time

FA.06	**Skip frequency**	**Default: 0.00Hz**	**Setting scope：0.00 ~ F0.05**
FA.07	**Range of skip Frequency**	**Default: 0.00Hz**	**Setting scope：0.00 ~ F0.05**

When the reference frequency is in the range of skip frequency, the actual frequency will be the border of the skip frequency and near the reference frequency, as shown in figure 6-18:

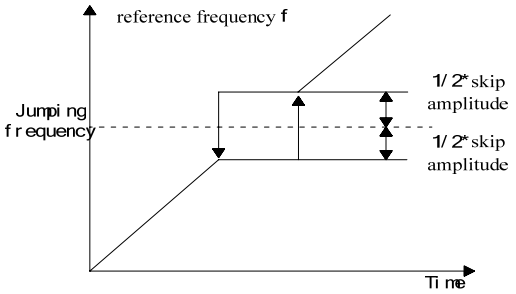


Figure 6-18 Illustration of skip frequency

By setting the skip frequency that will cause resonant with the load, which should be avoided. The drive can set a skip frequency point. If the skip frequency is set to 0, the function is invalid.

FA.08	**Traverse operating amplitude**	**Default: 0.0%**	**Setting scope: 0.0～100.0%(relative setting frequency)**
FA.09	**Jitter frequency amplitude**	**Default: 0.0%**	**Setting scope: 0.0 ～ 50.0%（relative traverse amplitude）**
FA.10	**Rising time of Traverse operating**	**Default: 5.0s**	**Setting scope：0.1～3600.0s**
FA.11	**Dropping time of traverse operating**	**Default: 5.0s**	**Setting scope：0.1～3600.0s**

Traverse function is widely used in textile and chemical fiber and the situation where need traverse and winding function.

Traverse function is that the output frequency of drive will bob up and down for the reference frequency as the center. The locus of traverse frequency with time is shown in fig.6-19, in which FA.08 is the reference value of traverse operating amplitude, when the FA.08 is set to 0, meaning is the traverse operating amplitude is 0, the traverse function is invalid.

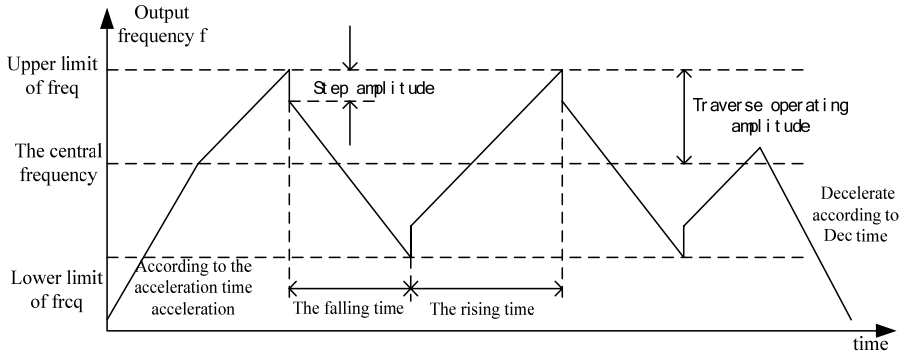


Figure 6-19 Illustration of traverse run

Traverse operating amplitude: the traverse operating frequency is limited by the upper/lower limit of frequency.

The traverse operating amplitude corresponds to the central frequency:

AW=central freq. ×FA.08

Jitter frequency=AW×FA.09, which is the Jitter frequency correspondence of the traverse operating amplitude。

The rising time of traverse operation: it is the time from the lowest point running to the highest point of traverse operating frequency.

The falling time of traverse operation: it is the time from the highest point running to the lowest point of traverse operating frequency.

FA.12	**Protection function selection 1**	**Default: 1101H**	**Setting scope：0000H～1101H**

FA.15	**Speed tracking exciting current percent**	**Default: 150.0%**	**Setting scope：0.0～200.0%**
FA.16	**Excitation time**	**Default: 300ms**	**Setting scope：10～3000ms**
FA.17	**Speed calculation judgment time**	**Default: 200ms**	**Setting scope：20～1000ms**
FA.18	**Voltage output soft start time**	**Default: 250ms**	**Setting scope：0～2000ms**

6.12 FB Group Protection Function Group

Fb.00	**Protection function selection 1**	**Default: 1101H**	**Setting scope：0000H～1101H**

Single digit：Over-voltage stall protection

0：Invalid

1：Valid

During deceleration, the motor's decelerate rate may be lower than that of drive's output frequency due to the load inertia. At this time, the motor will feed the energy back to the drive, resulting in the busbar voltage rising. Enabled over-voltage stall protection could prevent the busbar voltage rising effectively.

Decade：Quick current limitation action selection

0：Valid

1：Invalid

When quick current limitation is valid, and the output current of frequency inverter exceeds the current limitation level, the frequency inverter control the output current of frequency inverter within current limitation level through wave current limitation mode, but it would influence the load capacity of the frequency inverter.

Hundred：Input phase lacking protection

0：Invalid

1：Valid

Input phase lacking protection: select whether protect the input phase lacking situation.

Kbit：Output phase lacking protection

0：Invalid

1：Valid

Output phase lacking protection: select whether protect the output phase lacking situation.

Fb.01	**Protection function selection 2**	**Default: 0001H**	**Setting scope：0000H～0111H**

Single digit：Overload protection selection

0：Unprotected. Without motor overload protection characteristics (use carefully), the

frequency inverter has no overload protection to the load motor.

1：Protection

The frequency inverter conducts overload protection to motor through inverse time limit curve.

Decade：Fault reset times limitation is valid

0：Fault reset is not limit

1：It need to rest 3 minutes if fault happens three times within three minutes continuously.

Considering the damage caused to frequency inverter due to frequent fault, this function could be started to protect the frequency inverter, at the same time, this function could be used to remind the customer to check whether the parameter setting is valid or not or eliminating whether the around equipment is normal or not.

Hundred：Ground protection

0：Invalid

1：Valid

Fb.02	**Motor overload protection point**	**Default: 100.0%**	**Setting scope：20.0～120.0%（motor rated current）**

The motor will emit heat seriously if running overload in a long time, this parameter is used to set factor that the frequency inverter conduct thermal relay protection to the load motor, motor overload protection point=(allowed max load current/frequency inverter rated current)*100%.

In the situation that the big frequency inverter drives the small motor, it need to set this function code rightly to protect the motor. When one frequency inverter drive several motors and run in parallel, the thermal relay protection function will lose efficacy, in order to protect the motor, please install the thermal protective relay at the wire entering terminal or each motor.

Fb.03	**Busbar over-voltage stall protection point**	**Default: 130%**	**Setting scope：110～**

			150%

In the running process of frequency inverter, by detecting busbar voltage and comparing with the over-voltage stall point defined by Fb.03 (relative to standard busbar voltage), if it exceeds over-voltage stall point, the output frequency of frequency inverter will stop falling, and will continue to slow down again until the detecting busbar voltage is below over-voltage stall point.

Fb.04	**rapid current-limiting standard**	**Default：170%**	**setting range：100～200%**
Fb.05	**Frequency decrease rate in current limiting**	**Default：0.00Hz/s**	**setting range: 0.00 ~ 50.00Hz/s**

When the frequency inverter is running, but overload and motor actual speed rise lees than the raise rate of frequency, if we don't take measures, it will cause the frequency inverter trip caused by accelerated over-current fault.

The protect function of over-current and loss speed could compare with Fb.04 rapid current-limiting standard through checking current, when the frequency inverter is running. If the limit-current point is exceeded, output frequency of the frequency inverter will act Fb.05 order. And when the output current is lower than the limit-current standard, it will recover normal operation. As show figure 6-20

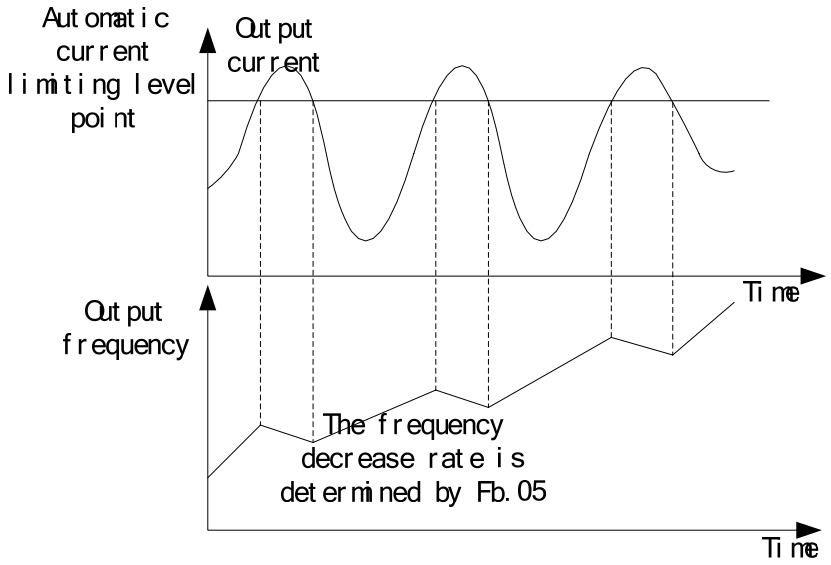


Figure 6-20 Illustration of current limitation protection function

Fb.06	**Fault automatic reset times**	**Default: 0**	**Setting scope: 0～3**
Fb.07	**Fault automatic reset spacing interval setting**	**Default:1.0s**	**Setting scope：0.1～100.0s**

Fault automatic reset times: When the frequency inverter select fault automatic reset, it could be used to set the times of automatic reset. If the continuous reset times exceed this value, the frequency inverter would be fault and standby, manual intervention is needed.

Fault automatic reset spacing interval setting: the time interval between fault happening and automatic reset action.

Fb.08	**The first two times fault type**	**Default: 0**	**Setting scope：0～25**
Fb.09	**The last fault type**	**Default: 0**	**Setting scope：0～25**
Fb.10	**Present fault type**	**Default: 0**	**Setting scope：0～25**

Recording the latest three times fault type of the frequency inverter: 0 indicates no fault, 1~25 represents 25 different fault. The detail is shown in fault check and elimination of

Chapter 8.

Fb.11	**Present fault running frequency**	**Default: 0.00Hz**	**Setting scope：**
Fb.12	**Present fault output current**	**Default: 0.0A**	**Setting scope：**
Fb.13	**Present fault busbar voltage**	**Default: 0.0V**	**Setting scope：**
Fb.14	**Present fault input terminal state**	**Default: 0**	**Setting scope：**
Fb.15	**Present fault output terminal state**	**Default: 0**	**Setting scope：**

Fb.16	**Retain**	**Default:**	**Setting scope：1**

6.13 FC Group Application Parameter Group 1

FC.00 ~ FC.06	Retain

6.14 FD Group Application Parameter Group 2

FD.00 ~ FD.04	Retain

6.15 FE Group Frequency Inverter Noumenon Parameter Group

This group is the parameter group of manufacturer, the user don't try to open this parameter, otherwise, it would cause the frequency inverter couldn't run normally or be damaged.

6.16 FF Group Monitoring Variable Group

This parameter supply different variable information, when the frequency inverter is operating. And it is just read.

Function code	Name	Unit and meaning
FF.00	Operation frequency	Unit: 0.01Hz

FF.01	Setting frequency	Unit: 0.01Hz
FF.02	Bus voltage	Unit: 0.1V
FF.03	Output current	Unit: 0.1A
FF.04	Output voltage	Unit: 1V
FF.05	Operation speed	Unit: 1RPM
FF.06	Output power	100.0% corresponding motor rated power
FF.07	Setting torque	100.0% corresponding motor rated torque
FF.08	Output torque	100.0% corresponding frequency inverter rated torque
FF.09	PID setting	0.0 ~ 100.0%
FF.10	PID feedback	0.0 ~ 100.0%
FF.11	Analog V1 input value	0.00 ~ 10.00V
FF.12	Analog V2 input value	0.00 ~ 10.00V
FF.13	HDI rapid pulse input	0.01 ~ 50.00kHz
FF.14	Input terminal situation	
FF.15	FM1 output voltage	0.00 ~ 10.00V
FF.16	FM2 output voltage	0.00 ~ 10.00V
FF.17	HDO rapid pulse output frequency	0.01 ~ 50.00kHz
FF.18	Output terminal situation	

FF.19	Main and auxiliary frequency source	0: Main frequency source setting frequency 1: Auxiliary frequency source setting frequency 2: Combination frequency set
FF.20	UP/DOWN frequency value	Unit：0.01Hz
FF.21	Multi-speed current segments	0 ~ 15
FF.22	PLC program operation current segments	0 ~ 15
FF.23	Relay input voltage	0.00 ~ 5.00V
FF.24	Output current percentage	100.0% corresponding frequency inverter rated current
FF.25	Rectifier module temperature	Unit: 0.1℃
FF.26	Inverter module temperature	Unit: 0.1℃
FF.27	Running time accumulated	Unit: Hour
FF.28	Motor overload percentage	Reaching 100.0% reports motor overload
FF.29	Frequency inverter overload percentage	Reaching 100.0% reports frequency inverter overload
FF.30	Frequency inverter rated power	Type confirm
FF.31	Frequency inverter	Type confirm

	rated voltage	
FF.32	Frequency inverter rated current	Type confirm
FF.33	Frequency inverter type	0：G type 1：P type
FF.34	Output upper-limit frequency	Unit: 0.01Hz
FF.35	VR potentiometer input percentage	-100.0 ~ 100.0%
FF.36	Analog V1 corresponding percentage	-100.0 ~ 100.0%
FF.37	Analog V2 corresponding percentage	-100.0 ~ 100.0%
FF.38	Rapid pulse input percentage	-100.0 ~ 100.0%
FF.39	Analog output FM1 corresponding percentage	0.0 ~ 100.0%
FF.40	Analog output FM2 corresponding percentage	0.0 ~ 100.0%
FF.41	Rapid pulse output HDO corresponding percentage	0.0 ~ 100.0%
FF.42	Main frequency	Unit: 0.01Hz

	setting	
FF.43	Auxiliary frequency setting	Unit: 0.01Hz
FF.44	U phase current per-unit value	
FF.45	V phase current per-unit value	
FF.46	W phase current per-unit value	

Input terminal situation and meaning：

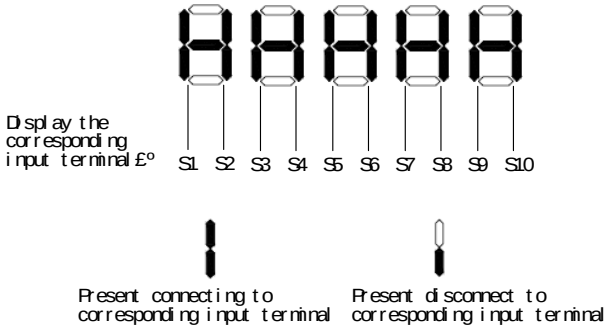

Display the corresponding input terminal
S1 S2 S3 S4 S5 S6 S7 S8 S9 S10
Present connecting to corresponding input terminal
Present disconnect to corresponding input terminal

Figure 6-21 Multi-function input terminal valid input drawing

Output terminal situation and meaning：

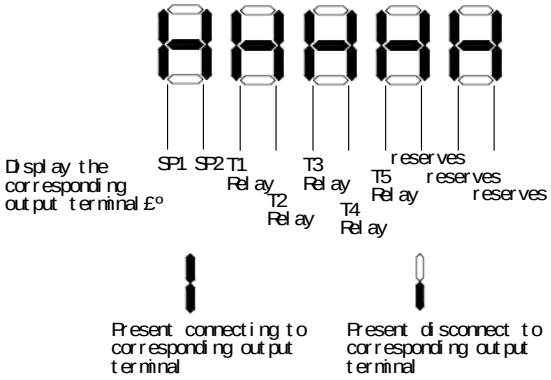

Display the corresponding output terminal
SP1 SP2 T1 Relay T2 Relay T3 Relay T4 Relay T5 Relay reserves reserves reserves
Present connecting to corresponding output terminal
Present disconnect to corresponding output terminal

Figure 6-22 Output terminal valid output drawing.

Chapter 7 Communication Protocol

VFD-G7 series VFD communicate with PC, PLC etc upper machines, and they need the support of standard expansion cards SC-EXT1-IO. And the cards supply RS485 communication interface. Between the upper user machine and frequency inverter communicate through the international standard ModBus communication, and the upper user machine as host machine, and the frequency inverter as slave machine. The communication content could be finished as follows: send operating command to frequency inverter, setting operating frequency, changing function code parameters, reading frequency inverter operation situation, monitoring parameters, fault information, function code etc.

7.1 Communication Allocation

Set baud rate and parity bit through F8.01.

7.2 Protocol Form

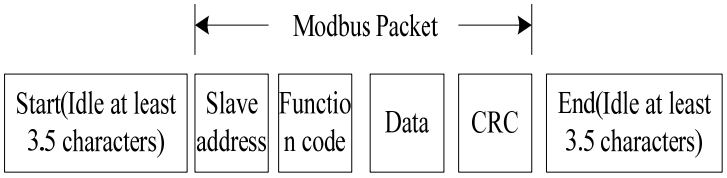


Figure 7-1 MODBUS protocol form

7.3 Protocol Form Instruction

7.3.1 Data type

All the data is presented by 16 system.

7.3.2 Salve machine address

The address of frequency inverter should be set through F8.00, 0 is broadcast address, slave address could be set to 1~247.

7.3.3 Read function code

Function code 03: present reading the variant the function code.

Realized function：reading frequency inverter operation situation, monitoring parameters,

fault information, function code , could read 6 continuous address frequency inverter parameter once time.

(1)Readable parameter address scatter：

Function	Address	Data and meaning
Operation status	1001H	0001H：running forward
		0002H：running reverse
		0003H：standby status
		0004H：fault status
Monitoring parameters	3000H	Operating frequency 0.01HZ
	3001H	Setting frequency 0.01HZ
	3002H	Bus voltage 0.1V
	3003H	Output voltage 0.1V
	3004H	Output current 0.1A
	3005H	Rotating speed 1RPM
	3006H	Output power 0.1%
	3007H	Output torque 0.1%
	3008H	Reference PID 0.1%
	3009H	Feedback PID 0.1%
	300AH	Terminal input state
	300BH	Terminal output state
	300CH	Analog V1 value 0.1V
	300DH	Analog V2 value 0.1V
	300EH	Reserve

	300FH	Reserve
	3010H	High frequency pulse HDI 0.01kHz
	3011H	Reserve
	3012H	Current stage of Multi-stage or PLC
	3013H	Reserve
	3014H	Reserve
	3015H	Reserve
	3016H	Reserve
Fault	5000H	0：no fault
		1：IGBT Short-circuits protection
		4：Over-current during acceleration
		5：Over-current during deceleration
		6：Over-current in constant speed operation
		7：Over-voltage during acceleration
		8：Over-voltage during deceleration
		9：Over-voltage in constant speed
		10：DC Bus under-voltage fault
		11：Motor over-load
		12：Frequency inverter over-load
		13：Input side loss-phase
		14：Output side loss-phase
		15：Rectifier’s heatsink overheat

		16：IGBT module's heatsink overheat
		17：External equipment fails
		18：communication fault
		19：Current detection circuit has fault
		20： Auto-learning fails
		21：EEPROM operation fault
		22：PID feedback disconnected fault
		23：Braking kit fault
		24：PID feedback stress fault 25：Reserve
Function parameter	Function code 16 system is FX.YZ High address: FX Low address: YZ	Corresponding function code current value

☞Note: The value read from drive is Hex data, which is the integer after ignoring the decimal point.

☞Note: The function parameter of frequency inverter divides into two part, one is high byte and low byte; the high byte presents the group serial number of function parameter; the low byte presents function parameter within the group number and need witch to 16 system.

（2）Frame in communication

The frame that slave machine send to frequency inverter：

Slave address	Function code	Parameter address high byte	Parameter address low byte	Read number high byte	Read number low byte	Parity bit high byte	Parity bit low byte

The frame that frequency inverter corresponding the upper machine：

Slave address	Function code	Read byte quantity	The first data high byte	The first data low byte	; ; ;	The n data high byte	The n data low byte	Parity bit high byte	Parity bit low byte

（3）For example

The upper machine read two data from the frequency inverter, and the two data is setting frequency and DC bus voltage , the address is 3001H, 3002H, and the upper machine should send the data to frequency inverter as follows;

Slave address	Function code	Parameter address high byte	Parameter address low byte	Read number high byte	Read number low byte	CRC Parity bit high byte	CRC Parity bit high byte
01	03	30	01	00	02	9A	CB

The setting frequency of frequency inverter is 50.00Hz (corresponding 16 system data is 1388H). Bus voltage is 5400v (corresponding 16 system data is 1518H).The frequency inverter feedbacks to the data to upper machine: n=2 is the number of variable quantity.

Slave address	Function code	Read number of byte （2*n）	The first data high	The first data low	The second data high	The second data low	CRC Parity bit high	CRC Parity bit high

			byte	byte	byte	byte	byte	byte
01	03	04	13	88	15	18	70	07

7.3.4 Write operation function code

Function code Realized function: change the frequency inverters' control command, frequency instruct, function parameter. Just modify a single frequency inverter's parameter once time.

06：Stands for the function code of writing variable

(1)The address distribution of writing parameter

Function	Address	Data and meaning
Communication control command	1000H	0001H: Run forward
		0002H: Run reverse
		0003H:Jog forward
		0004H: Jog reverse
		0005H: Stop
		0006H:Coast to stop(Emergency Stop)
		0007H: Fault reset
		0008H: Jog to stop
Address of communication setting frequency	2000H	0.00% ~ 100.00% , when setting 10000 (corresponding 16 system：2710H), the given frequency value is the largest frequency.
PID setting address	2001H	0.0% ~ 100.0%
PID feedback address	2002H	0.0% ~ 100.0%
Torques setting value	2003H	0.0% ~ 100.0%

Function	Address	Data and meaning
Upper-limit frequency setting value	2004H	0.0% ~ 100.0% , when setting 100.0% , the upper-limit frequency is equal to the max output frequency.
Function parameter	Function code 16 system is FX.YZ High address :FX Low address : YZ	Corresponding function code setting

☞Notice： The life of the EE PROM will be shortened if EE PROM is frequently stored. So the users should reduce the times of storing EE PROM. And some parameter under communication mode is no need to store, and just need to change the value in RAM. When writing the RAM value of parameter, you could just change the register high address from F to O is ok. If writing the RAM of F1.11, the register address is 010B. But the express method of register address could not use to read the frequency inverter function parameter.

（2）Frame in communication

The frame that slave machine send to frequency inverter：

Slave address	Function code	Parameter address high byte	Parameter address low byte	Data high byte	Data low byte	Parity bit high byte	Parity bit low byte

Frequency inverter corresponds the frame content of upper machine: frequency inverter return the data is same with upper machine.

（3）For example

Example 1：

The dec time of frequency inverter should change to 30.0s through upper machine,

corresponding 16 system data is 012CH, and store this setting when power-off. Dec time F0.11 responds the address of 16 system is F00BH.

And the upper machine sends the data to frequency inverter as follows;

Slave address	Function code	Parameter address high byte	Parameter address low byte	Data high byte	Data low byte	CRC Parity bit high byte	CRC Parity bit high byte
01	06	F0	0B	01	2C	CB	45

And the frequency inverter feedback to the upper machine as follows;

Slave address	Function code	Parameter address high byte	Parameter address low byte	Data high byte	Data low byte	CRC Parity bit high byte	CRC Parity bit high byte
01	06	F0	0B	01	2C	CB	45

Example2：

The dec time of frequency inverter changes to 30.0s through upper machine, corresponding 16 system data is 012CH, and not store this setting when power-off. Dec time F0.11 responds the address of 16 system is 000BH.

And the upper machine sends the data to frequency inverter as follows;

Slave address	Function code	Parameter address high byte	Parameter address low byte	Data high byte	Data low byte	CRC Parity bit high byte	CRC Parity bit high byte
01	06	00	0B	01	2C	CB	45

And the frequency inverter feedback to the upper machine as follows;

Slave address	Function code	Parameter address high byte	Parameter address low byte	Data high byte	Data low byte	CRC Parity bit high byte	CRC Parity bit high byte
01	06	00	0B	01	2C	CB	45

7.3.5 Abnormal Responding Function Code

（1）Abnormal responding form

For the normal response, the frequency inverter feedback to upper machine, according to the form 4.3.1 and 4.3.2.

For the abnormal response, the frequency inverter return to the abnormal response form as follows;

Slave address	Function code +80H	Abnormal code	CRC Parity bit high byte	CRC Parity bit high byte

（2）The meaning of abnormal code：

Modbus abnormal code		
Code	Name	Meaning
01H	Illegal function	The received function code from PC is not allowed operation；the slave device handles the requirement in the wrong state
02H	Illegal data address	The required address of the PC is not allowed; especially, register address and the number of bytes transmitted combination is invalid.
03H	Illegal data value	There are not allowed value in the receiving data field. □Note: It is never meaning that there is a value exceeded the application's expectation in the data items submitted to store.
06H	The slave device is busy	The drive is busy(E2PROM is storing)

10H	Error password	The written password from password checking address is different with the value (FP.03) set by users.
11H	Checking is wrong	When the RTU format, CRC checking bit or LRC checking bit of ASCII format of PC sending message is different with the calculated checking value, the wrong message will be send.
12H	Modified parameter is invalid	In the parameter written command, the data exceeds the parameter's range or the current state of written address can not be rewritten.
13H	System is locked	When the PC reads or writes, the user's password is set, and the lock of the password doesn't be unlocked, the system will report locked

（3）For example 1：To change the frequency inverter's main frequency source to 9 through upper machine, and store that setting value after power-off.

The upper machine sends the data to frequency inverter as follows;

Slave address	Function code	Parameter address high byte	Parameter address low byte	Data high byte	Data low byte	CRC Parity bit high byte	CRC Parity bit high byte
01	06	F0	00	00	09	7A	CC

But the max allowed setting value of main frequency source F0.02 sets 8, and when sets 9 is illegal data, and the frequency inverter return to abnormal code 03. And the frequency inverter returns to the data to upper machine as follows;

Slave address	Function code +80H	Abnormal code	CRC Parity bit high byte	CRC Parity bit high byte
01	86	03	02	61

7.4 CRC parity

Based on MODBUS-RTU' 16 CRC panty, get Parity bit high byte and low byte.

The CRC parity function as follows;

```
unsigned int crc_chk_value(unsigned char *data_value, unsigned char length)
{
unsigned int crc_value=0xFFFF;
int i;
while(length--)
{
crc_value^=*data_value++;
for(i=0;i<8;i++)
{
if(crc_value&0x0001)
crc_value=( crc_value>>1)^0xA001;
else
crc_value= crc_value>>1;
}
}
return(crc_value);
}
```

Chapter 8 Troubleshooting

Table 8-1 listed the possible faults of VFD-G7, and the fault code indicate range is from E001 and E004 ~ E025. Once a fault occurs, you may check it against the table and record detailed phenomena before seeking service from your supplier.

8.1 Faults and actions

Table 8-1 Faults and actions

Fault code	Fault categories	Possible reasons of fault	Actions
E001	IGBT module's shorted	Too short Acc time	Prolong the Acc time
		Inside IGBT is damaged	Seek service
		Interference causes the malfunction	Check peripheral equipment whether has strong interference
		Grounded is not good	Seeking service
E004	Over-current during acceleration	Too short Acc time	Prolong the Acc time
		Low AC supply voltage	Check the input power supply
		Drive power is too small	Select a high power drive
E005	Over-current during deceleration	Too short Dec time	Prolong the Dec time
		Low AC supply voltage	Use suitable dynamic braking kit
		Drive power is too small	Select a high power drive
E006	Over-current in constant speed operation	Sudden change of load or abnormal	Check the load or reduce the Sudden change of load
		Low AC supply voltage	Check the AC input power supply
		Drive power is too small	Select a high power drive
E007	Over-voltage during acceleration	Abnormal input voltage	Check the input power supply
		The rotating motor re-starts after the drive stops instantly.	Avoid re-start after the drive stops instantly

Fault code	Fault categories	Possible reasons of fault	Actions
E008	Over-voltage during deceleration	Too short Dec time	Prolong the Dec time
		Too big load inertia	Use big dynamic braking kit
		Abnormal input voltage	Check the AC supply voltage
E009	Over-voltage in constant speed operation	Abnormal change of input voltage	Install input reactor
		Too big load inertia	Use suitable dynamic braking kit
E010	DC Bus under-voltage	Low AC supply voltage	Check the AC supply voltage
E011	Motor over-load	Low AC supply voltage	Check the AC supply voltage
		Improper motor’s rated current	Modify motor’s rated current
		Load in creases suddenly	Check the load, adjust the value of torque boost
		The drive's and motor's powers don't match	Use suitable motor
E012	Drive over-load	Too short Acc time	Prolong the Acc time
		The rotating motor re-start	Avoid re-start after the drive stops instantly
		Low AC supply voltage	Check the AC supply voltage
		Too heavy load	Select a high power drive
E013	Input phase loss	Any of phase R, S and T cannot be detected	Check the input power supply
			Check the drive’s output wiring
E014	Output phase failure	U, V, W output loss (or the 3-phase loads are serious asymmetry)	Check the drive’s output wiring
			Check the cable and the motor
E015	Rectifier’s heatsink overheat	Instantaneous over-current	Refer to E004~E006
		Short-circuit among 3-phase output or line-to-ground short circuit	Rewiring

Fault code	Fault categories	Possible reasons of fault	Actions
E016	IGBT module's heatsink overheat	Vent is obstructed or fan does not work	Clean the vent or replace the fan
		Over-temperature	Lower the ambient temperature
		Wires or connectors of control board are loose	Check and rewiring
		Auxiliary power supply is damaged or IGBT driving voltage is too low	Seek service
		Short-circuit of IGBT bridge	Seek service
		Control board is abnormal	Seek service
E017	External equipment fails	Terminal SI used for inputting external faults acts	Check the input of the external device
E018	RS485 communication failure	Wrong baud rate setting	Set the baud rate correctly
		Serial port communication error	Press STOP/RST to reset, Seek service
		Communication break for long time	Check the wiring of serial port
E019	Current detection circuit has fault	Wires or connectors of control board are loose	Check and re-wire
		Auxiliary power supply is damaged	Seek service
		Hall sensor is damaged	Seek service
		Amplifying circuit is abnormal	Seek service
E020	Auto-learning fails	Motor's and drive's capacity doesn't match each other.	Replace the drive with another model
		Improper settings of parameters on the nameplate	Set the parameters correctly according to the nameplate

Fault code	Fault categories	Possible reasons of fault	Actions
		Auto-learned and standard parameters have large deviations	Let the motor no load, re-identify
		Overtime of auto-learning	Check the motor's wiring, parameters' settings
E021	EEPROM R/W fault	R/W fault of control parameters	Press STOP/RST to reset Seek service
		EEPROM damaged	Seek service
E022	PID feedback disconnected fault	PID feedback disconnected	Check PID feedback signal line
		the source of PID feedback disappears	Check the PID feedback source
E023	Braking kit fault	Brake line fails or brake pipe is damaged	Check the brake kit, update brake pipe
		The external braking resistance is small	Increase braking resistor
E024	PID feedback bigger fault	PID feedback bigger	Check PID feedback signal wire, if the PI parameter setting too bigger
E025	Reserve		

8.2 Common fault and handling methods

During using the drive, the following faults may occur, please refer to methods in the Table 8-2 to simply analyzing the faults.

Table 8-2 Common fault and handling methods

Phenomena	Possible reasons of fault	Actions
The drive doesn't display after power-on	Drive's input supply is inconsistent with the rated voltage	Check with a multi-meter and troubleshoot the issue.
	3-phase rectifier bridge blasted	Seek service

	The drive can not charge, CHARGE is OFF.	Seek service
The MCCB trips after power-on	Between the inputs of the supply have earth or shorted.	Troubleshoot the issue
	Rectifier breakdown,power line and motor line connect wrongly	Seek service
The motor is standstill after the drive running	The 3-phase outputs among U, V, and W are unbalance.	Check if damaged or obstructed
		Set the parameters correctly according to the nameplate
	Don't have output voltage	Seek service
The drive display is normal, after power-on, the MCCB of the power trips after operating	Between the phases of output module have shorted	Seek service
	Between the motor's lines have shorted or grounded	Troubleshoot the issue
	The distance between the motor and drive is far, Occasionally trips	Install output reactor

Chapter 9 EMC

9.1 Definition

EMC is that the electrical equipment is operating in the enviroment with electromagnetic interference, does not interfere electromagnetic enviroment and stably achieve its function.

9.2 EMC Standard Introduction

According to the requirements of national standard GB/T12668.3, the drive need to comply with electromagnetic interference and anti-electromagnetic interference two requirements. The existing products of the company execute the latest international standards: IEC/EN61800-3：2004 (Adjustable speed electric SVFl power drive systems-part 3:EMC Requirements and specific test methods) which is equivalent to the national standard GB/T12668.3.

IEC/EN61800-3 inspects the drive from EMI and anti-EMI two aspects, EMI mainly tests the drive's radiation, conducted and harmonic interferences (Corresponding the civil drive has the requirement). Anti-EMI mainly tests the drive's conducted immunity, radiation immunity, surge immunity, fast mutant burst immunity,ESD immunity and power low frequency end immunity (Specific test items are: 1. the experiment of input voltage dips, interruptions and changes immunity; 2, the experiment of commutation notches immunity ; 3, the experiment of harmonic input immunity ; 4, the experiment of input frequency change; 5, the experiment of input voltage unbalance; 6, the experiment of input voltage fluctuation).

According the stringent requirements of the IEC/EN61800-3 to test and according instructions shown in the 9.3 to install, Our products will have a good EMC for the general industrial environment.

9.3 EMC Direction

9.3.1 Harmonic Influence

The power's high-order harmonics will damage the drive. So in the area with poor power quality, propose to install the AC input reactor.

9.3.2 EMI and Installation Notes

Two kinds of EMI: one is electromagnetic noise of the environment to interfere the drive; the other is interference generated by drive to interfere the environment.

Note: A. The drive and other electrical equipments must be properly earthed.

B. Vertically wiring of the power input and control wire is best.

C. Output wire is proposed to use shielded cable, or use steel pipe to shield the wire, the shield must properly grounded, the interfered equipment should be shielded by multi-stranded, and the shield must properly grounded;

D. When the length of the motor's cable is over 100m, the output filter or reactor should be installed.

9.3.3 Handle interference of the environment to interfere the drive

The reason of the drive's electromagnetic influence for the environment is that there are many relays, contractors and electrimagnetic braking in the near of the drive. When the drive does malfunction for interference, propose the following solution:

A. Install surge absorbers in the component which can generating interference ;

B. Install filter in the drive input, refer to the 9.3.6 to operate.

C. The wire of the drive's input and the detecting line should use shielded cable, and be properly earthed.

9.3.4 Handle interference generated by drive to interfere the environment

There are two kind of the part noise: one is the radiation interference, and the other one is the conducted interference of the drive. Two kinds interference make the around equipments being induced by electrimagnetic or electrostatic. Then the devices have malfunctions. For several different kinds of interference, refer to the following methods to solve:

A. Generally the signals of instruments, receivers, sensors and other for measuring are weak , if they are close to the drive or in the same cabinet with drive, the devices will

be vulnerable to interference and malfunction, so propose the following solution: try to stay away from Interference source; do not make signal lines and power lines parallel arranging, especially parallel banding together; signal lines and power lines use shielded cables, and is properly grounded; install the ferrite bead (select the suppression frequency's range in 30~1000MHz), in the output side of drive and around 2 to 3 turns, in the case of bad, can choose EMC output filter;

B. When disturbed devices and the drive use the same power, resulting in conducted interference, if the above methods can not eliminate the interference, EMC filter should be installed between the drive and power (please refers to 9.3.6 about selection of the type);

C. Peripherals ground alone, can rule out when common ground to generate interference for the drive's ground wire having leakage.

9.3.5 Leakage current and its processing system

When use drive, there are two kinds of leakage current: one is the leakage current to ground; the other is the leakage current between line and line.

A. Influencing factors of the earth leakage current and solutions:

There is distributing capacitance between the conductor and the earth, the distributing capacitance is greater, leakage current increases; reduce the distance between the drive and motor to effectively reduce distributing capacitance. Carrier frequency is higher,the leakage current is greater; reduce the carrier frequency to reduce leakage current. However, reducing carrier frequency will lead motor's noise to increase, the installation of the reactor is also an effective way to solve the leakage current.

Leakage current increases with the loop current increasing, so the motor power is larger, the leakage current is larger.

B. Influencing factors of the leakage current between line and line and solutions:

Exist distributing capacitance between the drive's output wiring, if the current through the line has high order harmonic, it may cause resonance and generate leakage current. the thermal relay will be malfunction.

The solution is to reduce the carrier frequency or installing the output reactor. When use the drive, propose not to install thermal relay before the motor, and use the drive's electronic over-current protection.

9.3.6 Note of installing EMC input filter in the power input side

A. When install EMC input filter in the power side, propose using the EMC filter produced by Shanghai Eagtop Electronic Technology Co., Ltd;

B. ⚠ attention:

Please use the filter in strict accordance with rated value; because filter belongs the Itype electric, the metal ground of filter shell and the installing cabinets should be properly connected, and have good conducting continuity, Otherwise, lead to electric shock and seriously affect EMC effect;

C. Through the EMC test to find, the filter must be connected with the drive's PE to the common ground, otherwise EMC effect will seriously affected.

D. The filter should be installed as close as possible to the drive's power input side

Appendix 1 Instruction of Standard Expansion Card SC-EXT1-IO

I. Summary

Standard expansion cards, mode is SC-EXT1-IO, provides: RS485 communication hardware, one channel relay output one channel, high-speed pulse input and output, one channel output of relay. If you want to use this card, please set F0.18 to 1.

II. Mechanical Installation

The appearance of SC-EXT1-IO expansion card for the appendix drawing 1.

1、Please dismounting when the power is completely off;

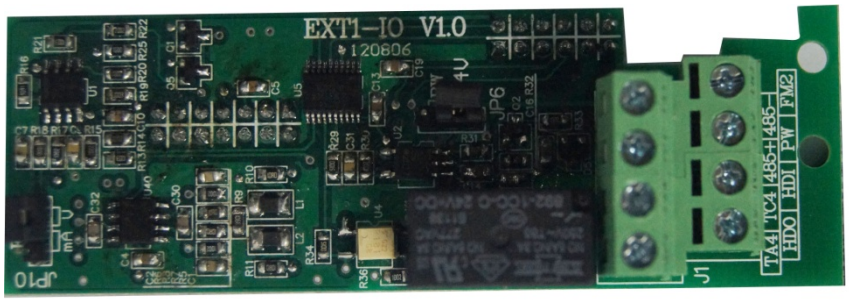
2、Please insert the bundled plastice piller on the control panel;

3、The plug seat CN1, J2 on expansion card should aim at corresponding CN1, J2 on control panel;

4、The hole site need aim to the plastic piller;

5、Press down the expansion cards hard to reserve the expasion cards and control panel connecting tightly;

The installation drawing between SC-EXT1-IO expansion card and control panel is shown in Appendix drawing 2;



Appendix 1 The appearance of SC-EXT1-IO expansion card

Appendix 2 SC-EXT1-IO Expansion card and panel installation diagram

III. Wiring Terminal Description

1、Terminal arrangement diagram

TA4	TC4	485+	485-	
HDO	HDI	PW	FM2	

2、Terminal Function Description

Type	Terminal symbol	Terminal name	Function description
Power supply	PW	External input power	External power supply, max input is 30V , the user could connect the power supply directly (between COM) , could also supply +24V power supply through this machine, and choose through JP6 JUMP WIRE on expansion cards.

Analog output	FM2	Analog output signal 2	The voltage or current output should be selected through JP10 JUMP WIRE on control panel. Output voltage range：DC 0V ~ 10V； Output current range：DC 0 ~ 20mA；
Rapid pulse input	HDI-COM	0.0 ~ 50.0kHz	1、Opto-couplers isolation 2、Input impedance：3.3KΩ 3、level input, the voltage range：9V ~ 30V
Rapid pulse output	HDO-COM	0.0 ~ 50.0kHz	Output voltage range：DC 0V ~ 24V Max output current 50mA
Relay output	TA4- TC4	Normally open terminal	Relay output, normally open Contact capacity: AC 250V/3A , DC 30V/1A
Communication interface	485+	RS485 communication+	Support standard MODBUS protocol
	485-	RS485 communication-	Support standard MODBUS protocol

3、Jumper Description

Jumper number	Description
JP6	Choose external power supply PW input or machine +24V power supply.
JP10	Analog output FM2 signal type choice Choose DC 0V ~ 10V or 0 ~ 20mA output

Appendix 2 Instruction of Relay-output Expansion Card SC-EXT2-R

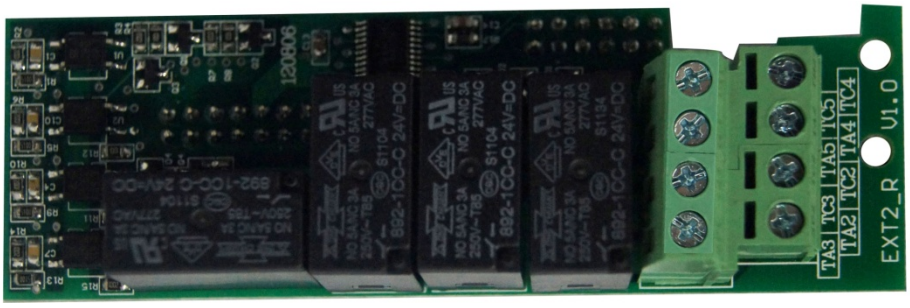
I. Summary

Relay output expansion cards, mode is SC-EXT2-R, function: 4-channel relay output, apply to “one drive two” constant pressure water supply and other occasion. When use this expansion cards, please set F0.18 to 2.

II. Mechanical Installation

The appearance of SC-EXT2-R expansion card for the appendix drawing 2.3.

Please check the description of SC-EXT1-IO for the direct installation method of expansion card and control board for reference.



Appendix 3 The appearance of SC-EXT2-R expansion card

III. Wiring Terminal Description

1、Terminal arrangement diagram

TA3	TC3	TA5	TC5
TA2	TC2	TA4	TC4

2、Terminal function description

Type	Terminal symbol	Terminal name	Function description
Relay 2 output	TA2- TC2	Normally	Relay output, open touch capacity: AC

Relay 3 output	TA3- TC3	open terminal	250V/3A，DC 30V/1A
Relay 4 output	TA4- TC4		
Relay 5 output	TA5- TC5		

Appendix 3 Instruction of Multifunctional Input Expansion card SC-EXT3-S

Summary

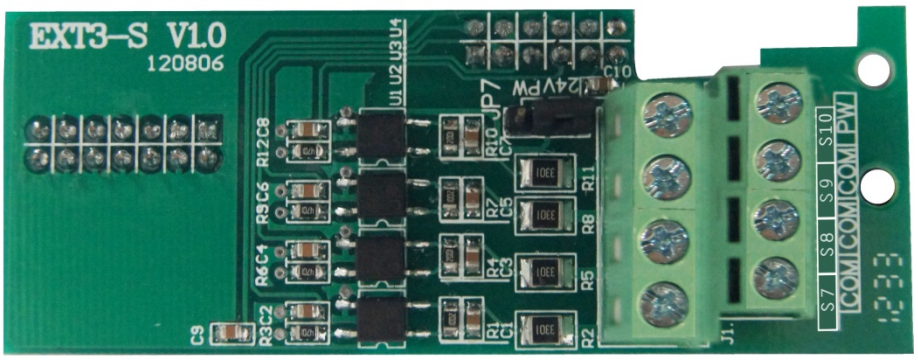
Multifunctional input expansion card, SC-EXT3-S, provide: 4-channel multifunctional input terminal, when using this expansion card, please set F0.18 to 3.

I. Mechanical Installation

The appearance of SC-EXT3-S expansion card for the appendix drawing 4.

Please check the description of SC-EXT1-IO for the direct installation method of expansion card and control board for reference.

.



Appendix 4 SC-EXT3-S appearance of expansion card

Wiring Terminal Description

Terminal arrangement diagram

S7	S8	S9	S10	
	COM	COM	COM	PW

2、Terminal Function Description

Type	Terminal	Terminal name	Function description

Digital input	S7—COM	Multifunction digital input terminal 7	1.Opto-couplerisisolation 2.Input impedance：3.3KΩ 3.Level input, the voltage range：9V ~ 30V 4.Programmable multifunction input
	S8—COM	Multifunction digital input terminal 8	
	S9—COM	Multifunction digital input terminal 9	
	S10—COM	Multifunction digital input terminal 10	
	COM	input terminal common port	
	PW	External power input	External power supply, max input is 30V ,the user could connect the power supply directly （between COM）, could also supply +24V power supply through this machine, and choose through JP7 JUMP WIRE on expansion cards;

3、Jumper Description

Jumper number	Description
JP7	Choose external power supply PW input or machine +24V power supply.

Guarantee Agreement

Warranty of the company products executes in accordance with "the quality assurance" in instructions.

1. Warranty period is 12 months from the date of purchasing the product
2. Even within 12 months, maintenance will also be charged in the following situations:

2.1. Incorrect operation (according to the manual) or the problems are caused by unauthorized repair or transformation.

2.2. The problems are caused by exceeding the requirements of standards specifications to use the drive.

2.3 After purchase, loss is caused by falling damage or improper transportation.

2.4 The devices' aging or failure is caused by bad environment (corrosive gas or liquid).

2.5 Earthquake, fire wind disaster, lightning, abnormal voltage or other accompanied natural disasters cause the damage.

2.6 Damage is caused during transport (note: the mode of transportation is determined by customers, the company helps to handle the transferring procedures of goods).

2.7 Unauthorized tearing up the product identification (e.g.: Nameplate, etc.); the serial number does not match the warranty card.

2.8 Failing to pay the money according purchase agreement.

2.9 Can not objective actually describe the installation, wiring, operation, maintenance or other using situation to the company's service units.

Head office: SPECTRA Technology CO., LTD.

Customer hotline: 886-3-7360023

URL: www.spectra-tw.com

E-mail: info@spectra-tw.com